LETTER REPORT
GARFIELD ALLOYS FIRE SITE
GARFIELD HEIGHTS, CUYAHOGA COUNTY, OHIO

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 5 Emergency Response Branch
9311 Groh Road
Grosse Ile, Michigan 48138

TDD No.:	S05-0312-007
Date Prepared:	March 30, 2004
Contract No.:	68-W-00-129
Prepared by:	Tetra Tech EM Inc.
START Project Manager:	Anne A. Busher
Telephone No.	(440)234-0886 ext 225
U.S. EPA On-Scene Coordinator:	Jeff Kimble
Telephone No.	(734) 692-7688

Tetra Tech EM Inc.

6801 Engle Road, Suite G ◆ Cleveland, Ohio 44130 ◆ (440) 234-0886 ◆ FAX (440) 234-1725

March 30, 2004

Mr. Jeffrey Kimble
On-Scene Coordinator
Emergency Response Section #1
U.S. Environmental Protection Agency
9311 Groh Road
Grosse Ile, Michigan 48138

Subject: **Letter Report**
Garfield Alloys Fire Site
Garfield Heights, Cuyahoga County, Ohio
Technical Direction Document No. S05-0312-007
Tetra Tech Contract No. 68-W-00129

Dear Mr Kimble:

The Tetra Tech EM Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) prepared this letter report in accordance with the requirements of Technical Direction Document (TDD) No. S05-0312-007 issued by the U.S. Environmental Protection Agency (U.S. EPA). The scope of this TDD was to conduct emergency response activities at the Garfield Alloys Fire (Garfield Alloys) Site in Garfield Heights, Cuyahoga County, Ohio. Specifically, Tetra Tech was tasked to prepare a health and safety plan, document site conditions with written logbook notes and photographs, conduct air monitoring, conduct multimedia sampling and make recommendations to the U.S. EPA based on site conditions and monitoring and sampling results. Emergency response activities were conducted by START members Stephen Wolfe, Kelly Smith, and Anne Busher. This report discusses site background information, emergency response activities, and analytical results.

The Garfield Alloys Site is the location of a massive fire that started in and engulfed Garfield Alloys, Inc., a magnesium recycling facility and a number of other surrounding buildings. The site is located at 4878 Chaincraft Road, Garfield Heights, Cuyahoga County, Ohio. The geological coordinates are 41°25.759' North and 81°35.803' West. The site occupies 16 acres and includes four buildings. The recycling facility processes and recycles magnesium into ingots for resale. The site is bordered to the north by the Norfolk Western Rail Road Line and a large cemetery; to the west by the Garfield Park Reservation and industrial areas; to the south by Chaincraft Road, Mill Creek, the Garfield Park Reservation and residential areas; and to the east by an industrial and residential area.

The fire started at approximately 3:00 p.m. on December 29, 2003, inside an area where 55-

gallon drums of magnesium arrived from other facilities and were opened. At the time of the incident, the company estimated that approximately 1,000,000 pounds of magnesium was present. Employees initially attempted to extinguish the fire, but it soon grew out of control. The Garfield Heights Fire Department responded to the fire and set up an incident command. At 5:00 p.m., U.S. EPA was requested to assist with the situation. At 6:00 p.m., U.S. EPA tasked Tetra Tech to respond to the fire and provide assistance to the U.S. EPA (see Attachment A, Log Book).

Magnesium is easily ignited and highly reactive with moisture; therefore, the rainy weather conditions on December 29 significantly complicated firefighting efforts. The large plume of smoke, flashes, sparks, and bright white light from the fire could be seen for miles (see Attachment B, Photograr :c Log). The loud explosions rattled the ground, even breaking windows in a nearby apartment complex. A product of the magnesium fire and the reaction of magnesium with moisture is magnesium oxide, a respiratory and eye irritant.

Tetra Tech arrived at the site at approximately 7:30 p.m. Routine air monitoring for volatile organic compounds (VOC), combustible gases, and oxygen was conducted at eight residential and industrial locations around the fire (see Attachment C, Air Monitoring and Sampling Locations Map and REAC DataRAM Results). Particulate and chemical-specific monitoring (for chlorine, ammonia and acid gases) was also conducted during the night and into the next days with a DataRAM and colorimetric Draeger tubes. VOC monitoring was conducted using a flame ionization and photoionization detectors (FID and PID). FID and PID monitoring results for VOCs mostly ranged from 0.0 to 2.70 parts per million (ppm), which did not exceed background levels. One result of 4.12 ppm was due to vehicle exhaust. Air monitoring results for radiation, oxygen, hydrogen sulfide, combustible gases, chlorine, ammonia, and acid gases were either nondetect or did not exceed background levels (see Attachment D, START Air Monitoring Log). START DataRAM results ranged from 0.002 to 2.6 milligrams per cubic meter (mg/m^3) in the middle of the densest portion of the smoke plume.

The City of Cleveland Fire Department mobilized a HAPSITE™ portable field gas chromatograph/mass spectrometer and an operator to the scene to provide real-time analytical data for VOCs from air samples collected by Tetra Tech. The air samples were collected in Tedlar bags at several locations during the late hours of December 29 and the early hours of December 30, 2003 including locations downwind of the plume and in residential areas. No VOCs were detected in any of the samples.

Tetra Tech collected a SUMMA canister of air from the smoke plume (sampling location #3) for volatile analysis (Method TO-14). In addition, two absorbent tube air samples for metals analysis and one absorbent tube sample for a VOC and petroleum hydrocarbon scan were

collected from a residential neighborhood (sampling location #6). An additional absorbent tube air sample for metals analysis was collected from a downwind industrial location (sampling location #4), and another tube sample was collected from a residential area (sampling location #7). Absorbent tube air samples were delivered early the morning of December 30, 2003, to the laboratory for quick-turnaround analysis for magnesium oxide and a VOC and petroleum hydrocarbon scan. At 4:00 p.m. on December 30, 2003, draft analytical results for magnesium oxide reported by the laboratory ranged from nondetect to 0.84 mg/m^3. The VOC and petroleum hydrocarbons scan results were reported as nondetect (see Attachment E, START Analytical Data Results).

U.S. EPA, the Cuyahoga County Health Department, and the Ohio Department of Health established the magnesium oxide action level for residential areas as 10 mg/m^3. The Agency for Toxic Substances and Disease Registry concurred that this level was appropriate for short-term exposure. This action level for magnesium oxide is based on the 8-hour, time weighted average (TWA) of 10 mg/m^3 for occupational exposure.

On December 30, 2003, the U.S. EPA Environmental Response Team (ERT), U.S. EPA Response, Engineering, and Analytical Contract (REAC) contractor, and START contractor Weston Solutions (Weston) arrived on site. REAC was tasked to collect 12 8-hour air samples (see Attachment C) for total metals analysis from locations immediately adjacent to the burn area and from the site perimeter. In addition, REAC set up three DataRAM particulate monitors around the burn area to assess particulate concentrations over an 8-hour period (see Attachment C). Weston assisted with conducting routine air monitoring at the eight residential and industrial locations around the fire. Weston also collected global positioning system satellite information for each of the eight sampling locations.

On December 30, U.S. EPA requested the mobilization of the ASPECT response aircraft from Region 7 to conduct thermal imaging and aerial photography, and to provide a Fourier transform infrared (FTIR) scan for the magnesium oxide concentrations in the smoke plume and at the fire site. The aircraft conducted eight passes over the fire with similar results. FTIR scan results indicated that a plume of the magnesium oxide was not detected leaving the fire at the time of the flyover. Specific magnesium oxide results could not be obtained from the FTIR scan, possibly because of the high energy radiance from the fire and the large amount of heat produced (see Attachment F, ASPECT Report).

On December 31, 2003, REAC completed the 8-hour air sampling event and sent the samples to the U.S. EPA ERT laboratory in Edison, New Jersey for metals analysis. The SUMMA canister sample collected by Tetra Tech was also sent to the ERT laboratory for VOC analysis. A representative from the U.S. Chemical Safety and Hazard Investigation Board and two State of

Ohio Fire Marshals were on site to conduct site and fire investigations.

VOC Results from the SUMMA canister air sample collected on December 30, 2004, were reported as nondetect for all compounds (see Attachment G, SUMMA Canister Analytical Results). The results for the 11 air samples collected (1 sample was lost) by REAC on December 31, 2003, and analyzed for total metals are presented Attachment H, REAC Air Sample Results.

If you have any question or comments regarding this deliverable, please contact me at (440) 234-0886 ext. 225, or Tom Kouris at (312) 946-6431.

Sincerely,

Anne A. Busher
START Project Manager
Tetra Tech EM Inc.

Attachments:

A	Log Book
B	Photographic Log
C	Air Monitoring and Sampling Locations Map and REAC DataRAM Results
D	START Air Monitoring Log
E	START Analytical Data Results
F	ASPECT Report
G	SUMMA Canister Analytical Results
H	REAC Air Sample Results

cc: Lorraine Kosik, U.S. EPA START Project Officer
Thomas Kouris, Tetra Tech EMI START Program Manager Letter Report Information

Attachment A

Log Book

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

LEVEL

All-Weather Notebook
No. 311

Garfield Alloys
4070 Chaincraft Rd.
Garfield Hts, OH
TDD: 505-0912-007

4 5/8" x 7" - 48 Numbered Pages

"Outdoor writing products for outdoor writing people."

Jim Irwin
216.789.9291

RECYCLABLE

"Rite in the Rain" - A unique All-Weather Writing paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather.

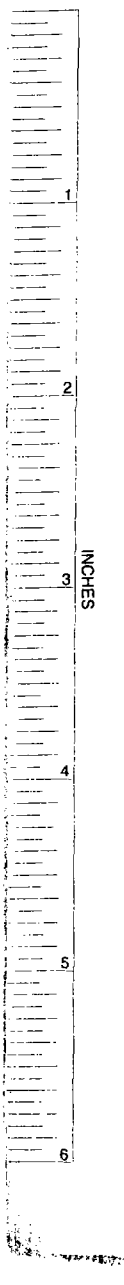
Available in a variety of standard and custom printed case-bound field books, loose leaf, spiral and stapled notebooks, multi-copy sets and copier paper.

For best results, use a pencil or an all-weather pen.

a product of

J. L. DARLING CORPORATION
Tacoma, WA 98424-1017 USA
(253) 922-5000 • FAX (253) 922-5300
www.RiteintheRain.com

NSN: 7530-01-433-5864



"Rite in the Rain®"
ALL-WEATHER WRITING PAPER

Name Anne Bushey - TetraTech
START Contractor

Address Kelly Smith - TetraTech
START contractor

Phone

Project OSC - Jeff Kimble
U.S. EPA Sroose Ilc, mi

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

12/29/03 garfield Alloys Fire

CONTENTS

PAGE REFERENCE DATE

1800 START Busher contacted by OSC Brad Stimple of U.S. EPA to respond to magnesium fire in Garfield Hts OH.
1815 left house for office & contacted steve wolfe to respond too.
1830 Arrived at the office to begin HASP.
1845 START wolfe arrived & began to load up the vehicle w/ equipment.
1900 Researched a little on magnesium fires.
1910 left the office for the site. Talked with OEPA OSC Jim Ivan on site. he will meet us at the Garfield Hts, fire Dept. and we will go to site.
1930 Arrived on site and were met by OSC Stimple

Amk 12/29/03

12/21/03 Garfield Alloys

2000 Drove down to the site to see the situation and talk to the chief.

OSC Irwin + Stimple talked to Collover Garfield Hts Fire Chief ~~Everett~~ He would like us to monitor for volatiles metals and LEL, O2 in the plume in the residential areas along Miles Rd and E. 93rd St

2130 Continued to watch the fire as OSC Irwin and Stimple Continue to collect info.

2200 Drive along miles w/ OSC Irwin + OSC Kimble, who was now arriving on site.

Arrive at a school along miles at E. 119th St. to calibrate the equipment to monitor the air in the residential neighborhoods.

12/21/03

12/25/03 Garfield Alloys

2230 Complet calibration of instruments.

Pump # ~~[illegible]~~ 146160

calibrated 1.022 Liter/min

sample for metals MT-01

Calibrated TVA 1000 model 70547 to zero air

Calibration ok; battery ok

calibrated the PID w/ isobutylene and the FID w/ methane

Calibrated the CGI to O_2 and LEL, and H_2S already to go!

background with TVA1000 is 2.63 ppm

Pump # 146059 calibrated to 1.109 liter/min; sample for metals. MT-02

Anna 12/29/03

4

12/23/03 Sanfield Allogy
Pump #3 Cleveland #3
1.706 liters/min will be
run for Volatiles

2301 Sample VO-01; volatile
organic sample started.
Sample collected off of
Miles ave. btwn E. 111th and
E. 110th streets.
Pump #3 MT-01

2309 13 Sample ~~VO-02/MS~~
setup on; sample for metal
pump number 146588

~~2310/MS~~ 2310 Sample for metals
MT-02 with sample pump
number 146060 was set.
The sample was set up
along the fence line along
of ~~Miles~~ Miles Road btwn E 111
and E. 112th streets along
a back

12/29/03

12/23/03 Garfield Alloys

2314 Pump time for the Volatiles VOA-1 VOA2 7 minutes.; Pump #3 1.755 liters/min - final calibration

Readings w/ TVA-1000 were 3.73 ppm; background was 2.63 ppm

Weather: temp 40°F; rain; wind out of SW; temps dropping.

Readings w/ the PHD-1.1k were O2 20.3 % O2; LEL = 0; and CO = 0.0

Reading w/ the U.S. EPA MultiRAE SN = PGM50-51 = VOC = 0.0; CO = 0.0; H_2S = 0; Oxygen = 15.6 %; and LEL = 0.0.

2323 readings on the TVA1000 = 4.12 ppm

Collected the Dräeger ammonia, chlorine + acid tubes all were non-detect. SM 12/23/03

12/29/03 Garfield Alloys

2330 readings on the TVA in the plume were 3.17 ppm

2335 MW-01 sample was collected final cal = 1.033 L/min at the fence btwn E. 110 + E. 111 streets

2340 MW-02 sample was collected final cal = 1.073 L/min at the fence btwn E. 110 + E. 111 streets

00114604 E. 131st Garfield Gardens Apt. collected 1 Tedlar air sample by Cleveland Fire Dept. in air sampler bag it back to the Garfield Hts Fire Dept. to run it on the HAPsite that belongs to Cleveland Fire Dept. Tom Binder (acsc) is here to operate the HAPsite.

The sample was collected at the entrance to an apartment complex. In a residential neighborhood.

AK

12/29/03

12/30/03 Sarfield Alloy
Sample Resident-01 at 4604 E. 131st Street.

1510 14200 Broadway Ave.
collected 1 Tedlar bag and 1 Summa canister of air for underneath the major portion of the plume
0145 Returned to the Fire dept. so that Lt. Bindernagel could run the sample on the HAPSITE. Readings taken with the TVA 1000 were 2.50 ppm on the FID the PID is not operating correctly, possibly due to rain/humidity. CGI was 20.3% O2; LEL was 0.0%; H2S = 0.0 ppm;
0200 HAPSITE readings are not above background. It is a standard chart.

[signature] [signature]

12/30/03

12/30/03 Sarfield Hts/Boys

Ealier in the evening is the fire significantly expanded when the fire spread to a second building. The explosions rattled the doors of the Sarfield Hts fire dept located at Turney and McCracken. The sounds of the explosions occurs one after another - in quick succession. The explosions lite up the sky and you could see sparks high up in the clouds. The clouds generated by the explosions filled the sky. ———

The Hapsite was staged in the Sarfield Hts, Fire Department. We - START - ran samples back + forth.

Weather: weather continues to be rainy, temps have dropped to low 40's - upper 30's; winds have shifted the plume towards the intersection of McCracken Road and Turney Rd. Rain is hard + steady. ———

12/30/03

12/30/03 Garfield Alloys
Fire Fighters mention that the area we first assembled in was now flooded.
OEPA & the U.S. EPA contact the plant managers. Greg ORR contacted the plant manager to set some air out here to monitor the water quality of the creek. Slovich Bellevue Mike & Chuck ~~Slotski~~, ~~Bellview~~, OH in Migrated Company.

Sample location #1 Marymount Hospital at the 1st drive of McCracken
#2 Clarendon & Park Knoll
#3 McCracken & Broadway in the Tonite lounge Parking lot
#4 Forest dale & Broadview
#5 6131 st Street 44004
#6 Btw E. 110 & E. 111
#7 ~~Shelley~~ Park & Canton
#8 Garfield & Broadway.
0430 Several hundred families have been evacuated.

[signature] 12/30/03

12/30/03 Garfield Alloy
Chris - the health & Safety person for Garfield Alloy said that all we have is the magnesium onsite.
Osc Kinsle and Kelly want to begin to make a plan

4775 - Covak Automatic Screw Parts
- diesel oil 5000 sal; lubricating oil 8-55 sal

*4825 Renew Furniture Refinishers

4865 Cardamone Construction
2,000 heating oil

*4864 Clockwork Courier

*4801 Chatcraft Tavels Container
- 10 - 30lb Propane tanks; flammable liquids in storage

* no longer at that address
OK 12/30/-3

12/30/03 Garfield Alloys

*4801 Chaincraft VIP Insulation
- bondmaster adhesive.

*4801 Chaincraft - in Dart
- none

*4801 Chaincraft Graebner Landscaping
Thompson Aluminum
- 4 - nothing

4850 Chaincraft Thompson Aluminum
- none
→ mayhaw dust

4801 Broadway Truck
diesel + mineral spirits

4875 Crestar Heat Treat Co.
1-55 gal. diesel fuel.

4855 Halifax Ind.
- none

4826 Chaincraft
@ GPB Performance Inc.
- vehicles inside GR 12/30/03

12/30/03 Garfield Alloy
Chuck Slovich owner
330-225-8022
Osc Kimble + Kelly call Mr. Chuck
Slovich the owner of the Garfield
Alloy

0557 Pump # 14658 started at 557
0000 1.044 calibrated at 0557;
will collect metals and be
MT-03 from Beachwood Clinic
at Broadway + Forestview Rd.
START Busher calibrated the Personal
Data Ranger
1.6 w/ wind and 0.45 w/out
wind. 2.6 in high smoker
We set the sampling up at the Beach-
wood Systems clinic located at
Broadway. The wind is picking
up and there is visible smoke
adjacent to this facility is a
trailer park w/ many trailers
A very light snow is falling. Temps
have dropped to low 30's and
winds are out of NW going SE
Multi Rae 0.0 CO; 0.0 H2S; O2 20.3%
PID 0.0; TVA 0.0 H2S; O2 20.3%; PID = X FID

12/30/03 MT-03

0620 Sample was collected and prepared
1.056 L/min was final calibration
Winds died down and smoke has reduced. at present.

1255 Pump # 146500 for sample MT-04 was initiated. at the corner of Edgepark and Layton in front of house
1.063 L/min. Temp is low 30's. light smoke
Reading for the personal Data Ram was 0.0 mg/m3
The MultiRAE 0.0 H2S 20.8% O2 0.01 PID = x
1327 the sample is pulled off for analysis. The final flowrate is 1.060 L/minute.

---

84 units were evacuated for the Hemlock street Apartment. Another 80 units surrounding that area.

[signature] 12/30/03

- 12/30/03 Garfield Alloy
1,000 tons of magnesium produced or 1, million pounds. The magnesium was in ingots; and what ever the product was. ——

estimated that we used 0.25 million gallons per hour of water.

08^{30} The Fire Dept. is putting a new product on the fire to see if it will stop it

1000 Determined that addition poop will be needed to assist.

1100 Requested that URS obtain a GIS person. to assist. —

1200 OSC Stimple + OSC Dumo arrived on site; STARTS Smith + Bisglow arrived on site. to spell Wolfe and Bushor

1400 Wester Returns - very little plume left in air monitors. Fire appears to be smoldering.

12/30/03. Garfield Alloy

1430 ERT REAC on site will set additional air samples at pre-determined location #1-8 and areas inside the boundaries of this area

- Weston Completes 2nd Round of air monitoring

1700 GIS system update

OSC demob to pick up equipment-over for site. REAC continues to collect samples. START has completed Air Monitory plan; and pickup to OSC

REAC: 10 sample locations.

→ Cuyahoga County determined that the action level for residential MgO is not toxic but is an irritant for eyes & inhalation.

He stated that Mg is water reactive in its fine form.

$$Mg + H_2O \rightarrow MgO + H_2$$

He stated that GW & electricity have been turned off

Action level $10^{mg}/_{m^3}$ as MgO.

12/30/03 Garfield Alloys

→ Transcribed notes from

Garfield Alloys
12205 Broadway, Garfield, OH
4878 Chaincraft, Garfield, OH
216-581-6355

- Talked to Chief Collova (Garfield Hts)
- Chief stated no citizens have called w complaints this far.
- He said no one was hurt or killed except fire dept personnel (From street)
- He was not sure how fire started
- Chief said he talked to a Greg (Facility Rep.) but Greg left NO info.
- Chief stated that the area was evacuated.
- ~~Jack Kemble~~ Jeff Kimble & Brian Kelley, USEPA came in & reported finding from their sampling efforts.
- Chief called Cuyahoga County EMA He stated that there was an industrial fire & that the Ohio & USEPA tested air quality.

12/30/03 Garfield Alloys Fire

-He stated that the area was evacuated and at the time there was no detection of contaminants in the air. The Fire dept still recommended that citizen seal up their homes & remain indoors (windows & doors closed.) If residents do leave there is a shelter at the Garfield fire Station #1.

A 1:46 AM Gorr & Jim Irwin went to Garfield fire dept.

2:05 G. orr calls Kaver (H&S Manager) 216-214-7804

He said that the Bulk of the material was Mg (a couple of million pounds) in different forms: ① Mg flesh
② Mg Powder
③ Mg block

There were also Maintenance Solvents, processing chemicals, 10 nitrogen cylinders & 6 SO_2 cylinders (~900 lbs)

12/30/03

Garfield Alloys

Also Foundry Flux material
(used in refining Mg)
(Its a potassium flouride &
sodium hydroxide material)
The Flux is also used to
extinguish Molten Metal.

Owners
Mike & Charles SLOVIC

Plant Manager: Greg Rausch 216-214-7805
G. ORR called Greg R. Greg R
said he didn't have owners number.
G. ORR asked if they hired a consultant yet
G. Rausch said NO that it would
be the owners call to make.
G. ORR told him about the severe
Env. impact & that the USEPA would
be charging the company, so its
would be would be in their
best intrest to get their own
Consultant working on the case
A.S.A.P Greg R. said he didn't
know the cause of the Fire
Greg said he didn't have numbers
for owners; however he said

12/30/03

Sarfield Alloys

the number for owner; however he said the name of the company where they would be treated was Magotteh in Bellvue, Ohio Greg ORR 330.963.1189.

END of Transcription

Reac sample collected over 8 hrs.
CGI, FIDIPID, DataRam also collects
#1-#8 MCE Filter only
#9 DataRAM only
#10-#11 MCE Filter
#12-#3 Data RAM & MCE

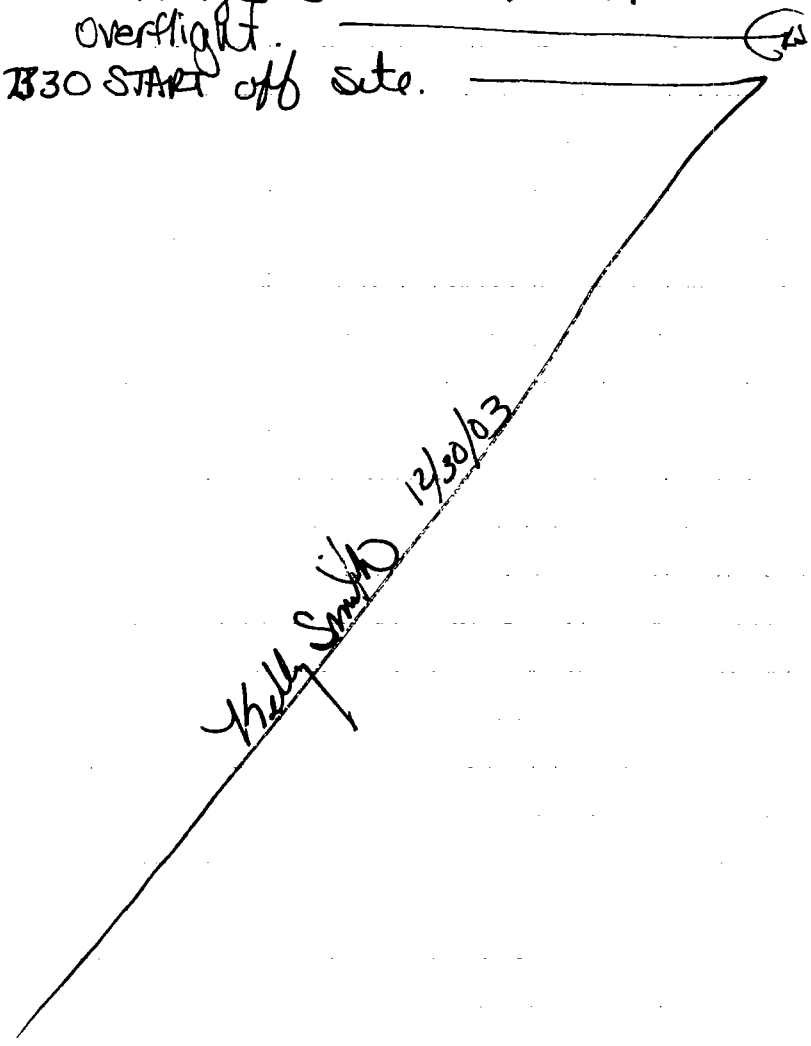
#13 Upwind
12 source
11 South down
10 100 ft south of #11
9 250 ft south #11 [closest to building]

DataRAM - 8 hour runtime
Reac will ship samples via cargo to SRT in Edison New Jersey

20 12/30/03

Sarfie H All-)

2000 Fire is still smoldering. REAC checks on samples.
IR images evaluated. from overflight.
1330 START off site.



12/31/03

Garfield Alloys.

0740 START arrives at fire station No. 1.
Weather: overcast, temp ~ 32°F,
wind chill ~ 20°F

Fire is still smoldering. All evacuations have been lifted.

REAC processing samples. Last night: One datalram failed and one sample pump was stolen (reac will supply data)

0830 REAC downloads datalram summaries for START

1145 Talked w/ H+S guy for Garfield Alloy sulfpher dioxide 150lb cylinders were found intact inside standby portion of the site. START Bushey onsite w/ OSC Kinkle and OEPA Reggie Brown to survey the site and talk w/ site personnel. The consel for the company as well as some workers were on site. OEPA OSC Regional Brown requested that the company 1) controll the runoff from the fence from entering the storm sewers

Garfield Alloys 12/31/03.

2) Provide security to the facility and 3) set the sulpher dioxide cylinders and any other cylinders off site. He expected that to be done by today. He will be on site tomorrow to make sure that happens. While on site a small fire erupts in the back of the facility the fire depart got back there.

OSC Brown informed the U.S. EPA OSCs that there will be a meeting at the OEPA with offic of Garfield Alloy and U.S. EPA + ohio EPA. OSC Brown would like to have U.S. EPA at the meeting OSC Kimble requested that either OSC Durno or OSC Fredk come to the meeting. He also requested the START supply one person.

1200 walked back to back of build + took pictures of them. The sulphe dioxide is intact "safe"

Sanfield Alloy 12/31/03

1230 Osc Dunn & Fredle removed the trailer from the site to return to the Westlake office

The Fire Marshall was on site with representatives from the Sanfield HB Fire Department

1350 Mike Morris of U.S. Chemical Safety and the Z. Board arrives w/ two reps for Ohio Fire Marshall arson investigators. So back to the Sanfield HB. Fire Dept. to pack up equipment and team for the day.

OK

12/31/03 MK

12/31/03

I-504 Surfield Alloy

0910 meeting at OEPA w/ state local representatives discuss that run-off material had low pH and high lead potentially caused by the run-off of potash

Their is high (ammonia) vol reaction of magnesium dross and fires. It is a chemical reaction that occurs and is routine.

Reggie Brown - OEPA OSC wants to have every person + agency mention what each group is concerned with.

OEPA = asbestos = concerned about any asbestos; even less than < 1% must be considered contaminated

Jim Veris (OEPA) = confirmed that building should be inspected.

One of the buildings that burned on site was an demolition comp

OK — TR 1/5/10

Garfield Alloy 1-5-03

- that did asbestos remediation
No real answer about the asbestos
- in the building from the demolition company owner.
- J. Veneski (EPA) mentioned that any any remodeling that was done may have inspections that included asbestos. If any of that was done then Cleveland the Div. may have been received
- Steve Tuckerman (DSW) said that the info that he received that the 1st round did not have values above water criteria. He is concerned about water runoff. NEKSD said that they may have new data that suggests that copper data may be above acute levels.
- They are still concerned about ammonia, zinc, pH and copper; suspended solids
- U.S. EPA concerned about the ammonia.

9E — 1-5-03

SM 1-5-04

DSW wants the results

The company put in expandable plugs in the sewer. The water is contained.
Rich Connell said there are no combined sewers in the immediate area.

95 + 97 orders were issued to the company because of discharge into Blue lagoon
The Co. now works with the NEORSD to discharge to their system
The company presently has 2 lagoons; the easterly lagoon receives H2O from the storm sewer. The westerly lagoon receives the historic wastes.
DSW = asked NEORSD if they could discharge to the sewer NEORSD said yes.

SM 1/5/04

CMZ 1/5/04

DSW wants treatment system to be sent to a treatment system before discharge. The NEORSD is concerned about metals, ammonia;

Cell = no violation of fine water, does the fine water. runoff sample collected by NEORSD cover the Cell violation runoff.

NEORSD wants to see analytical results + a treatment system

PTI or approval of director permit to Install

DSW + NEORSD want a PTI - usually takes a week; but will get done.

Cuyahoga Fire Dept. concerned about the ammonia concentrations.

Regie Brown said the company is monitoring for ammonia.

CMZ 1/5/04

Garfield Alloy 1/5/04
The SHFD Chief Collour said that Jim Irwin was monitoring a large white plume that came off of the site. Irwin readings were 200 ppm in plume 2 ppm outside of plume.

Cuyahoga HD rep. Romano was ok with magnesium oxide public health numbers. Reggie wanted the CCHD to take lead in the construction waste

1000 meeting w/ representatives from Garfield Alloy
Chris of Garfield Alloys state
Two security officers on site at all time:
1 controlls the road + access; the 2nd patrols the fence line goes over plan the history; the map; the list of wastes + materials onsite.

GR 1/5/04

1/5/04 29

Garfield Alloy ~~[illegible]~~

each post had M-130 flux & at each fire post; class D extinguishers.

Pres. of Garfield Alloy the flux 10,500 of M-130 flux stored in warehouse 3; brought in 25,000 lbs of additional M-130 flux.

The NEOBSD did an analysis of of the flux and found high levels of copper in mg/kg.

The GA company does not have any add. info on the flux metal constituent.

GA retained ATJ environment.

On 12/31/03 ATJ responded at GA ~~[illegible]~~ request

1) berms at back
2) retention basin - pumped in holding tank; then transferred to Garfield city waste water treatment.
3) Plug the sewers on site.

Presently the GA has collected on 1/5/04

Surfield Alloy 1/5/04

10,000 gallons. On Thursday after the water was collected begin then most water (6,500) collect on Sunday 1/4/04.

NEORSD = R. Conrad requests that the inflation devices be checked routinely

Checked the runoff + GA fee no water has left site to sew and to Mill Creek.

Ammonia is by product of magn reaction. The more moisture present the more likely to form ammonia it formed.

GA did ammonia testing arou warehouse C; also did sampling btwn main facility and warehouse C. did grid sampling

1/2/04 pulled 6 samples w highest in Centum of wareh C was Zyppm. Those resu were reported to SHFD + OEPA.

Andy 1/5/04

Garfield Alley 1/5/04

yesterday due to rain, plumes of smoke was coming off the site.

JA is collecting ammonia air samples around the top of hill at the fence line near apartments at 20ppm a technician went into place to get 110ppm ammonia

Osc Brown told JA Chris that it would be likely that OEPA will request an ammonia monitor to provide continuous monitors

JA would like to monitor at the apartments, back by the Bannon's demolition Co. + 3rd location

also will step up monitoring for ammonia when 1. rubble is moved 2. when it rains or snowed (or specific humidity level).

JA 1/5/04

32

1/5/04 Garfield Alloy
OSC Brown requests that any work that will require an explosive or fire risk that that work would require appr from the GHFD. OEPA will not be experts — Chief Collins will revi
OSC Fiedler recommends that infrared be used for hotspots

GA Chris talked w/ OSC Brow at ~~DAB~~ 1/2/04 and propose in plan how will they approac this clean up. They discussed w/ Regele about
1) Swab 4 samples of the ash for RCRA metals + pH for analysis
2) wipe samples of of building materials to dispose; will need to determine # of samples

OEPA air - said that the waste will be required a asbestos expert must do a evaluation specialist)
1/5/04

1/5/04 Garfield Alloys

Visual inspection of the site building or other areas involved in the fire. If no bulk samples, then sample of debris should include asbestos sampling will need to survey the Bachman building. the matrix of roof materials

Concern about the road access of the small companies that are behind the affected site. may need to reroute the road.

OSC Brown said that GA will need to talk to the adjacent owners so that GA knows all about the industry and that they are responsible for the environmental portion but GA must get permission from the owners of the property to do any entry on the site; or damage

OSC Brown feels that asbestos are 1/5/04

1/5/04 Garfield Alloys will drive the clean-up.
OEPA Jim Veras stated that if asbestos was found in the debris. then the magnesium ingots could be considered ACM.
GA Chris stated if ingots are found in the pile + are "cleaned" could be ~~appropriate~~ appropriate d cleaned.
Chris states that refer to NFPA 480 reference material.
If Chris for GA requested by OEPA + provide to Reggie and Chief of Calozza to provide documentation + proof that the ingots could be cleaned safely
OEPA Jim Veras will need to see the proof that they are "cleaned"
Reggie stated that all building material it asbestos it found would be required to be considered ACM.
GR 1/5/04

Garfield Alloys 1/5/04

Reggie stated that the ingots may be able to be cleaned but will need to be approved by Chief Calozza + Reggie

- Runoff from the site should be < 10 ppm ammonia.
- Steve Tucker from OEPA DSW wants the company know that the temp, hardness, pH + zinc ammonia, copper should be collected if there is a problem or an accidental release.

- Reggie requested the plan be redone and include an ammonia sampling plan. Reggie will issue a Notice of Violation letter to tell them of problem + cell site number
  216 4843
  216 214 7804 cell @ Chris
  (937) 790 0760 cell TST
  ckenzie@garfieldalloys.com env.w
  CLee@garfieldalloys.com 1/5/04

GA will have a plan to Reggie by 1/15/04

Attendance at meeting and the Garfield Alleys plan to cleanup (draft) are to be found in site files

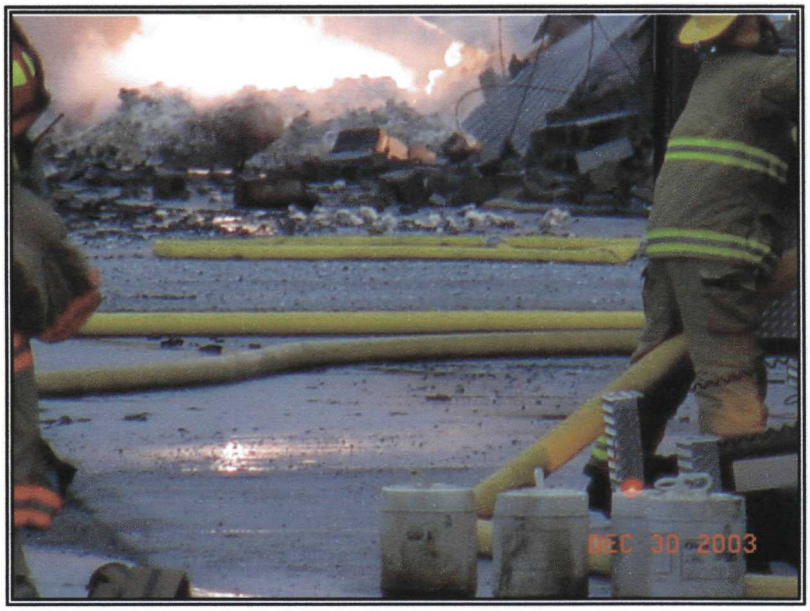
1/5/04

Attachment B

Photographic Log

Photograph No.: 1
TDD No.: S05-0312-007 **Date:** Not known
Location: Garfield Alloys Fire site
Subject: Garfield Alloys prior to fire

Photograph No.: 2
TDD No.: S05-0312-007 **Date:** December 29, 2003
Location: Garfield Alloys Fire site
Subject: Fire at Garfield Alloys facility in Garfield Heights, Ohio



Photograph No.: 3
TDD No.: S05-0310-010 **Date:** December 30, 2003
Location: Garfield Alloys Fire site
Subject: Fire at Garfield Alloys after approximately 12 hours.

Photograph No.: 4
TDD No.: S05-0312-007 **Date:** December 31, 2003
Location: Garfield Alloys Fire site
Subject: Burn area covered with flux used to smolder the fire

Attachment C

Air Monitoring and Sampling Locations Map and REAC DataRAM Results

Attachment D

START Air Monitoring Log

Table 2
Garfield Alloy Fire
Air Monitoring Log

Date: 12/29/03

Sample #/ Location	Time	O2	H2S	FID	PID	LEL	Data RAM	Sampler Name
1.								
2.								
3.								
4.								
5.								
6.	2230 2314	 20.3%	 0.0	2.63 ppm*	0.0 ppm 0.0 ppm ~ 0.0 ppm			Busher wolfe
7.								
8.								

Sample Locations: 12/29/03 upwind background

1. Sample location #1: [redacted]
2. Sample location #2:
3. Sample location #3:
4. Sample location #4:
5. Sample location #5:
6. Sample location #6:
7. Sample location #7:
8. Sample location #8:

Equipment used:

CGI: pHD lite - START

PID: U.S. EPA multiRAE - gray case PGM50-SP

FID: TVA 1000 - START

DATA RAM:

Table 2
Garfield Alloy Fire
Air Monitoring Log

Date: 12/29/03

Drager

Sample #/ Location	Time	O2	H2S	FID	PID	LEL	~~Data~~ RAM	Sampler Name
1.								
2.								
3.								
4.								
5.								
6.	2323			4.12 3.12x			0.0 cl 0.0 acid 0.0 NH_3	Bushra wolfe
7.								
8.								

Sample Locations:

x collected at 2326

1. Sample location #1: [redacted]
2. Sample location #2:
3. Sample location #3:
4. Sample location #4:
5. Sample location #5:
6. Sample location #6:
7. Sample location #7:
8. Sample location #8:

Equipment used:

CGI:_____ PID:_____

FID: START TVA 1000 DATA RAM:_____

Table 2
Garfield Alloy Fire
Air Monitoring Log

Date: 12/30/03

Sample #/ Location	Time	O2	H2S	FID	PID	LEL	Data RAM	Sampler Name
1.								
2.								
3.	0136	20.3%	0.0	2.58	—			
4.	0557	20.3% * / 20.3%	0.0 / 0.0*		0.0 *	0.0 / 0.0*	1.6 Yuma 0.45 Howard 2.6 Imperial	
5.								
6.								
7.	655	20.3 / 20.3 *	0.0 / 0.0*		0.0*	0.0 / 0.0*	0.0	
8.								

* MultiRAE

Sample Locations:

1. Sample location #1: [redacted]
2. Sample location #2:
3. Sample location #3:
4. Sample location #4:
5. Sample location #5:
6. Sample location #6:
7. Sample location #7:
8. Sample location #8:

Equipment used:

CGI: pHD lite

PID: MultiRAE

FID: _____

DATA RAM: _____

Garfield Alloy Fire
Air Monitoring Log

Date: 12-30-03

particulates

Sample #/ Location	Time	O2 (%)	H2S (ppm)	FID (units)	PID (units)	LEL (%)	Data RAM	Sampler Name
1.	1126	20.6	0	0.41	0	0	Real Time 0.012 TWA 0.010	TSM
2.	1205	20.2	0	1.90	0	0	0.008 0.008	TSM
3.	1215	20.3	0	2.70	0	0	0.016 0.004	TSM
4.	1230	20.3	0	2.18	0	0	0.010 0.010	TSM
5.	1245	20.3	0	2.05	0	0	0.012 0.012	TSM
6.	1315	20.6	0	2.24	0.06	0	0.007 0.037	TSM
7.	1330	20.7	0	2.51	0	0	0.005 0.033	TSM
8.	1350	20.6	0	2.70	0	0	0.041 0.031	TSM

Sample Locations:

1. Sample location #1: [redacted]
2. Sample location #2:
3. Sample location #3:
4. Sample location #4:
5. Sample location #5:
6. Sample location #6:
7. Sample location #7:
8. At the intersection of

Equipment used:

CGI: _____ PID: _____

FID: _____ DATA RAM: _____

Frank J. Beadrap - Weston Solutions, Inc.

Table 2
Garfield Alloy Fire
Air Monitoring Log

12/3/03

Date:

Sample #/ Location	Time	O2	H2S	FID	PID	LEL	Data RAM	Sampler Name
1.	1400	20.2	0	X	0	0	0.018 0.033	TSM
2.	1245	20.2	0	X	0	0	0.018 0.043	TSM
3.	1853	20.2	0	X	0	0	0.020 0.051	TSM
4.	1850	20.1	0	X	0	0	0.028 0.043	TSM
5.	[redacted]	20.1	0	X	0	0	0.041 0.041	TSM
6.	1835	19.4	0	X	0	0	0.014 0.038	TSM
7.	1815	19.5	0	X	0	0	0.021 0.033	TSM
8.	1820	19.6	0	X	0	0	0.022 0.038	TSM

Sample Locations:

1. Sample location #1: [redacted]
2. Sample location #2:
3. Sample location #3:
4. Sample location #4:
5. Sample location #5:
6. Sample location #6:
7. Sample location #7:
8. Sample location #8:

Equipment used:

CGI:_____ PID:_____

FID:_____ DATA RAM:_____

Mark L. Reddy – Water Solutions, Inc.

Garfield Alloy Fire
Air Monitoring Log

Date: 12-30-03

Sample #/ Location	Time	O2	H2S	FID	PID	LEL	Data RAM	Sampler Name
1.	6:00	20.6	0	X	0.1	0	Real Time 0.002 TWA 0.040	TSM
2.	6:15	X	X	X	X	X	X	No Access
3.	6:30	20.5	0	X	0	0	0.007 0.040	TSM
4.	6:50	20.8	0	X	0	0	0.039 0.062	TSM
5.	~~7:50~~ 7:10	20.2	0	X	0	0	0.006 0.064	TSM
6.	7:30	20.2	0	X	0	0	0.003 0.056	TSM
7.	7:40	X	X	X	X	X	X	No Access
8.	7:50	20.3	0	X	0	0	0.007 0.047	TSM

Sample Locations:

1. Sample location #1: [redacted]
2. Sample location #2:
3. Sample location #3:
4. Sample location #4:
5. Sample location #5:
6. Sample location #6:
7. Sample location #7:
8. At the intersection o

Equipment used:

CGI:_____ PID:_____

FID:_____ DATA RAM:_____

Mark L. Bradley – Weston Solutions, Inc.

Time	Location / PDR	Reading	Instrument
[illegible]	9 - [illegible] downwind of site	CO 1, LEL-0, VOC-0, H_2S 0, O_2 - 19.9	MultiRAE
	[redacted]	0. ~~493~~ 473	PDR
1720	10 - #2 downwind Sample	H_2S-0 O_2-19.9 CO 0, LEL 0, VOC-0	
	[redacted]	0.345	
	100 gals		
1730	11 - #3 downwind Sample	CO-0, LEL-0, VOC-0 H_2S 0, O_2-19.9	
	[redacted]	~~0.459~~ 0.059	
	350 gals		
1750	12 - TW source Sample / PDR	CO-0, LEL-0, VOC-0 H_2S 0, O_2 20.1	
	[redacted]	~~0.462~~ 0.297	
1750	13 - Upwind Sample / PDR	CO-0, LEL-0, VOC-0 H_2S 0 O_2-19.9 0.016	
	[redacted]		

12/31/03 Frank L. Bailey — Weston Solutions, Inc.

Attachment E

START Analytical Data Results

EA GROUP

Laboratory Analytical Report

TetraTech EMI, Inc.

6801 Engle Road

Suite G

Cleveland, OH 44130

Attention:

Kelly Smith

Project Identification

Garfield Alloys

Purchase Order:

EA Group
Order Number

0312-00283

Donald R. Richner, CIH

Laboratory Manager

December 30, 2003

EA GROUP

Project Summary

The following analytical report contains the results as requested for samples submitted to EA Group. The results included in this report have been reviewed for compliance with the analytical methods indicated in this report. All data have been found to be compliant with accepted laboratory protocol. Exceptions, if any, are noted below. Analytes appearing in bold type were analyzed at a subcontract facility. EA Group is VAP, AIHA and ELLAP accredited. For industrial hygiene reports, air and/or surface concentrations results are based upon field sampling information provided by the client. Unless otherwise noted the following apply: Sample condition was acceptable upon receipt and Industrial hygiene results will not be blank corrected.

Data Interpretation

For assistance with report interpretation or questions regarding regulatory limits, please contact Client Services at 440-951-3514 or customerservice@eagroup-ohio.com.

Sample Summary

Sample Receive Date: 12/30/2003

EAG Sample Identification	Client Sample Identification	EAG Sample Identification	Client Sample Identification
031200283 - 001	MT-01	031200283 - 002	MT-02
031200283 - 003	MT-03	031200283 - 004	MT-04
031200283 - 005	VO-01		

Quality Control Narrative

A GC/MS scan of the sample for volatile organics failed to identify any compounds above our quantitation limit.

****

 Unless noted, soil, sludge, and sediment results are reported on dry weight basis. The "Sample Reporting Limit" is based on the method used for analysis and does not refer to any regulatory limit. These results relate only to the items tested.

EA GROUP

EAG Workorder: 0312-00283

Client Project: Garfield Alloys

EAG ID: 0312-00283-1 **Client ID: MT-01** **Sampled: 12/29/2003** **Received: 12/30/2003**

Parameter	Result	Sample Reporting Limit	Units	Prep Date	Analysis Date	Analyst
Magnesium as MgO, Air: NIOSH 7300	0.26	0.14	mg/m3	12/30/2003	12/30/2003	CMB

EAG ID: 0312-00283-2 **Client ID: MT-02** **Sampled: 12/29/2003** **Received: 12/30/2003**

Parameter	Result	Sample Reporting Limit	Units	Prep Date	Analysis Date	Analyst
Magnesium as MgO, Air: NIOSH 7300	0.22	0.13	mg/m3	12/30/2003	12/30/2003	CMB

EAG ID: 0312-00283-3 **Client ID: MT-03** **Sampled: 12/29/2003** **Received: 12/30/2003**

Parameter	Result	Sample Reporting Limit	Units	Prep Date	Analysis Date	Analyst
Magnesium as MgO, Air: NIOSH 7300	0.84	0.13	mg/m3	12/30/2003	12/30/2003	CMB

EAG ID: 0312-00283-4 **Client ID: MT-04** **Sampled: 12/29/2003** **Received: 12/30/2003**

Parameter	Result	Sample Reporting Limit	Units	Prep Date	Analysis Date	Analyst
Magnesium as MgO, Air: NIOSH 7300	<0.12	0.12	mg/m3	12/30/2003	12/30/2003	CMB

EA GROUP

EAG Workorder: 0312-00283
EAG ID: 0312-00283-005
Client ID: VC-01
Client Project: Garfield Alloys

Matrix: Tube
QC Batch / Analyst: 045701 / DFM

Date Sampled: 12/29/2003
Date Received: 12/30/2003

Parameter	Result	Reporting Limit	Units	Date Analyzed
GC/MS Semivolatiles Scan	<0.044	0.044	ppm	12/30/2003

EA GROUP

EAG Workorder: 0312-00283
EAG ID: 0312-00283-005
Client ID: VO-01
Client Project: Garfield Alloys

Matrix: Tube
QC Batch / Analyst: 045702 / DLZ

Date Sampled: 12/29/2003
Date Received: 12/30/2003

Parameter	Result	Reporting Limit	Units	Date Analyzed
Organics in Air: OSHA 7				12/30/2003
Total Hydrocarbons as Toluene	<0.044	0.044	ppm	12/30/2003
Special Media Desorption	Complete			12/30/2003

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

REGION 5
77 West Jackson Boulevard
Chicago, Illinois 60604

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	Analyte: Magnesium metal; dust	Analyte: Volatile Organics	Activity Code:
	Garfield Alloys				

SAMPLERS: *(Print Name and Sign)*
Steven A. Isgrow — with — Stephen Wolfe

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	TAG NUMBERS
MT-01	12/20/03	2230		X	Between E110 + E111	Volume = 32.65 Liters
MT-02	12/29/03	2231		X	Between E110 + E111	Volume = 32.67 Liters
VO-01	12/29/03	2307		X	Between E110 + E111	Volume = 12.1 Liters
MTD3	12/30/03	0957		X	Broadway - Forest View	Volume = 32 Liters
MT04	12/30/03	0955		X	Edgepark + Leyden	Volume = 33.92 Liters

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
S. Wolfe	12/30/03 11:22	
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)* — Date / Time: 12/30/03 1122

Ship To: Fax results to: 816-478-8389
Please ship to: [illegible]
ATTN:
Airbill Number
Chain of Custody Seal Numbers

Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File

Attachment F

ASPECT Report

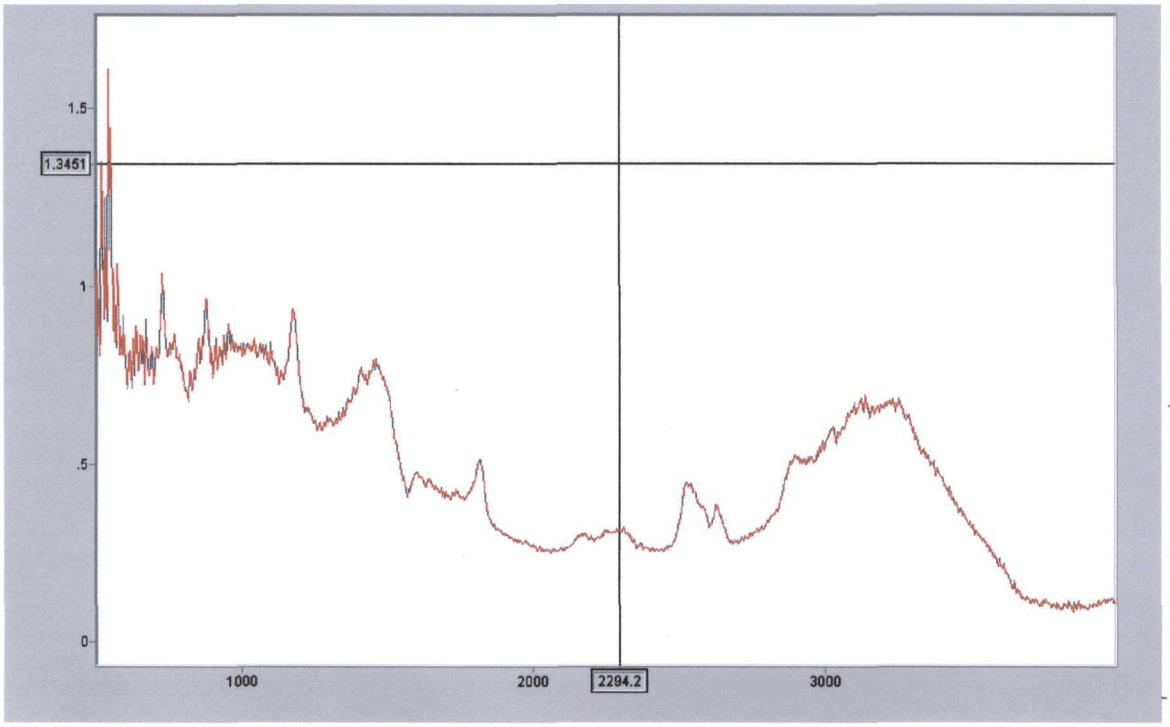
Preliminary Interpretation of IR Spectra from the Ohio Magnesium Fire.

Data Collected on 30 December 2003.

The ASPECT system was used to image the magnesium fire near Garfield Heights, Ohio. At times this fire was spectacular with intense heat due to the burning magnesium. Magnesium is a very active metal and once ignited burns at extremely high temperature. One of the primary combustion products of burning magnesium is magnesium oxide. This material is a white, powdery solid with a melting point of 2800 C.

ASPECT is an airborne hyper/multi-spectral Infrared (IR) system used to image and identify chemical plumes. Typically, the system is used to detect gaseous emissions. ASPECT uses a high speed spectrometer (Bomem MR-254AB) running at 80 hertz. A spectral resolution of 16 wavenumbers is used at this scan speed. The spectrometer collects a scan at a ground resolution of about 0.75 meters. The spectrometer is used to provide a hyper-spectral signature of the gas. Based on this signature, a library match can be made with unknown identification. The other principle sensor used is a Raytheon RS-800 Line Scanner. This is a multi-spectral (14 band) imager which will produce an image of approximately 1200 meters based on the normal operational altitude of the aircraft. The Line Scanner uses a collection of cold optical filters to provide spectral discrimination of the collected data.

At approximately 1430 GMT Region 7 contacted Region 5 concerning the magnesium fire near Garfield Heights. The ASPECT program manager indicated that ASPECT had potential to image the plume emanating from the fire. This was based on a spectra of MgO pulled from the Galactic Data Base and is given in figure 1.



An examination of this spectra shows several features in both the 8 to 12 micron (800 to 1400 wavenumber) region and the 3 to 5 micron (2200 to 3500 wavenumber) region. The absorbance of this compound tends to be high with values approaching 1 absorbance unit in the 8 to 12 micron region. Several peaks standout including peaks at 880, 1176, 1460, and 1816 wavenumber, respectively. The 3 to 5 region shows a peak structure at 2531 wavenumber.

Figure 2 shows a single beam scan taken over the residual fire. Figure 3 shows an overlay of the two scans. Note that the scan taken over the fire has not been spectrally subtracted due to the high energy content of the signal. A comparison of the two spectra shows little peak correlation in the 900 to 1200 wavenumber region. This is not unexpected due to the large energy content of the sample. A peak of interest occurrs at 1816 wavenumber. This is a portion of the longwave region that is normally obstructed by water vapor and carbon dioxide. In this case a reasonable match is noted with similar band structure. This is likely due to two factors. Since the energy level of the signal is so high, data normally absent due to water vapor/carbon dioxide interference have sufficient energy to be discriminated from the interferent background. Second, since this is on the lower portion of the normal blackbody curve of the detector envelop, a signal present in this region indicates the presence of a compound. Further examination of the spectra show an elevation of the general trend of the blackbody between 850 and 900 wavenumbers. This may be due to the compound influencing the signal due to the 876 wavenumber peak.

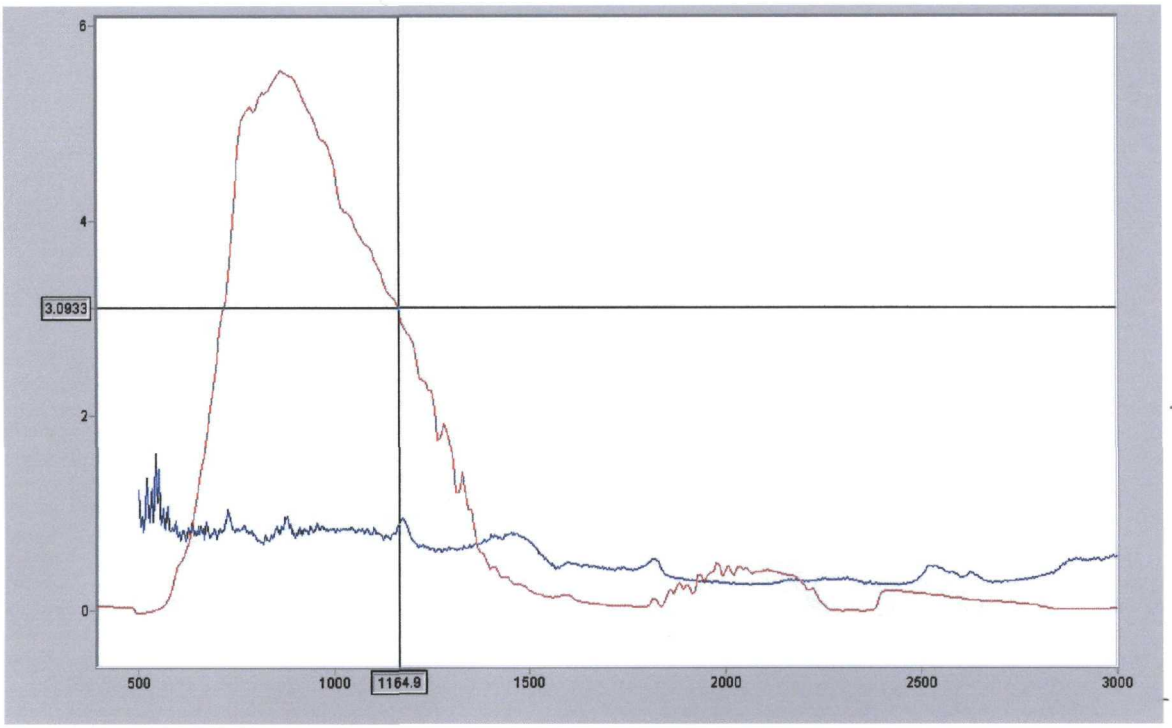


Figure 4 shows a on overlay of a similar scan collected on a subsequent base of the aircraft. A peak analysis show agreement with the previous aircraft pass with peaks at 876, and 1816 being similar. This scan also shows a potential indication at 1603 wavenumbers.

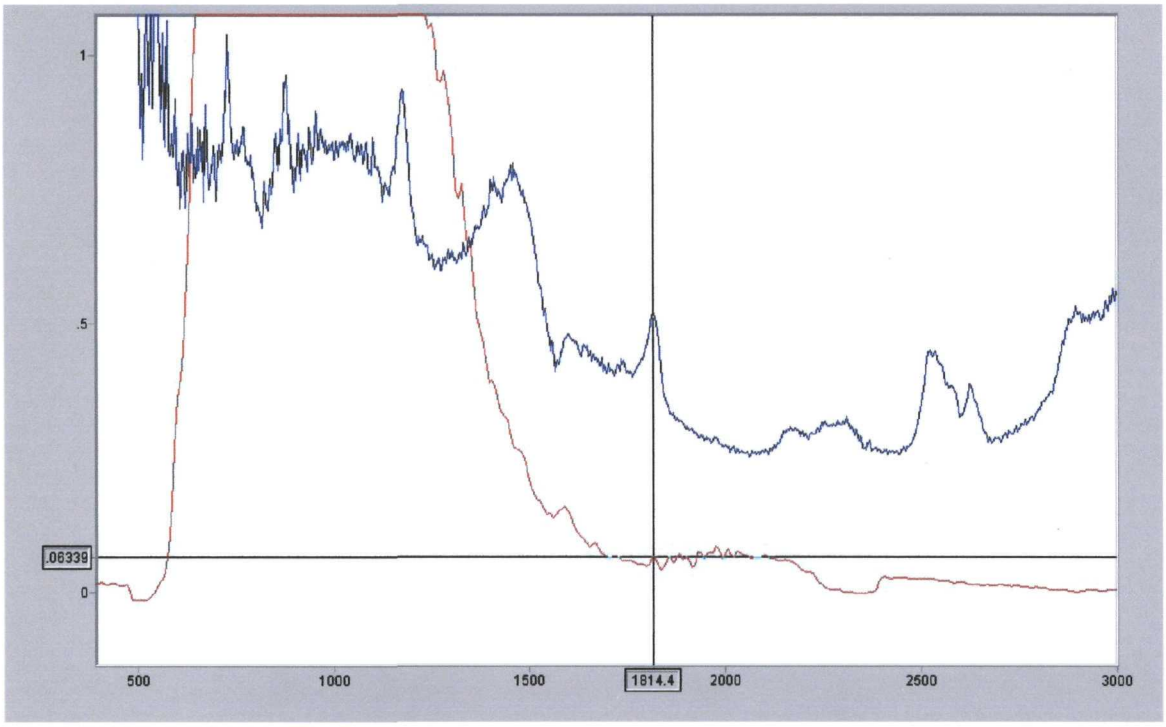
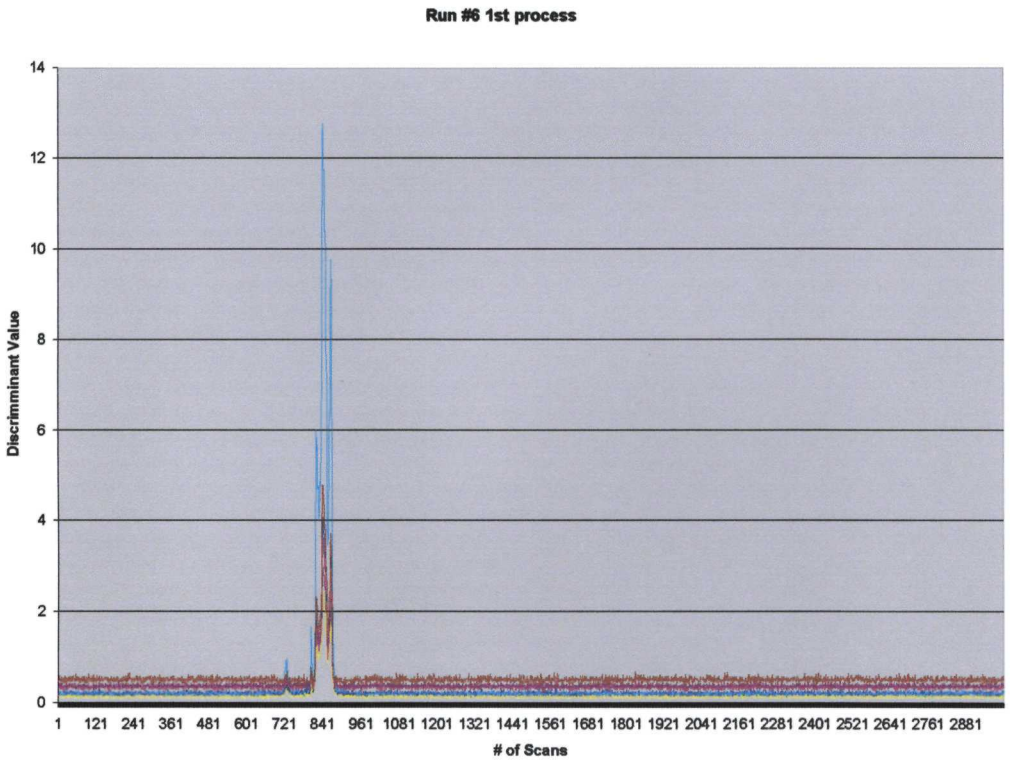


Figure 5 shows the results of a discrimination analysis using digital filtering to identify spectra showing a significant difference from a background training set. An examination of this figure clearly indicates repetitive regions of similar spectra. A portion of this discrimination is caused by the high energy radiance coming from the fire. The remainder of the discrimination is due to spectral feature.



Assigning a concentration of MgO based on this spectra is difficult due to high energy of the situation. MgO is formed due to the combustion of Mg and is most likely emitted initially as a vapor (boiling point of 3600 C). It is probable that the spectral features observed are in fact due to IR absorptive-mode features of the vapor. MgO is converted to a solid rapidly upon cooling and subsequently looses the absorptive-mode character. The full data set will be required to extract a subtracted spectra but based on the high absorbance of this material, a concentration of less than 250 ppm-meter is emanating from the fire.

Figure 6 shows an IR image collected using the IR line Scanner. No detectable plume was present. The Line Scanner is a multi-spectral imager with 14 bands in both the 8 to 12 and 3 to 5 micron region. The figure 6 was generated by using a bands in the 9, 10, and 12 micron regions to provide a RGB display. The only significant feature is the elevated temperature areas due to the fire. A total of 8 passes were made with the aircraft with similar results for each pass. In summary, a plume was not detected leaving the heated areas.

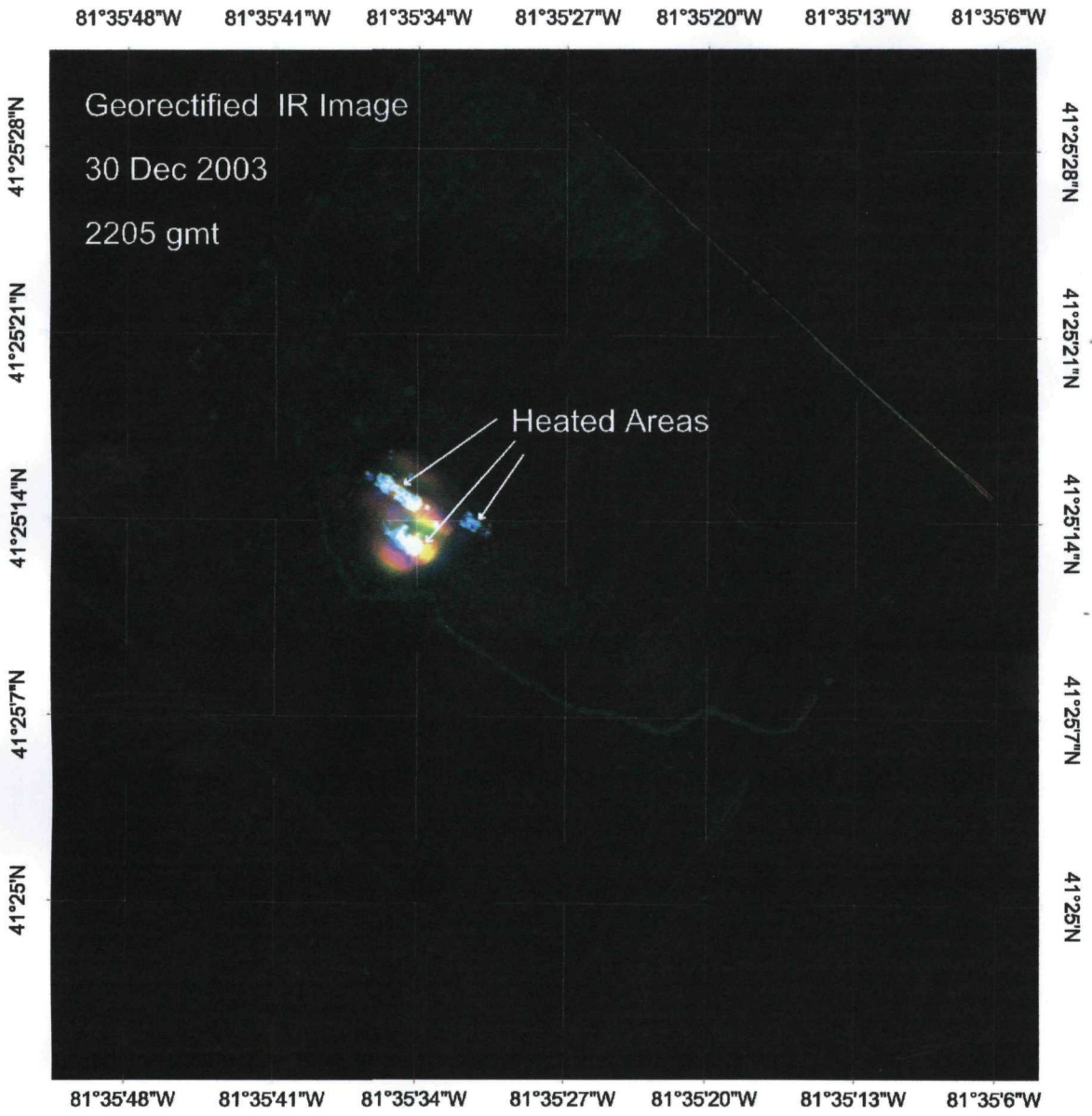
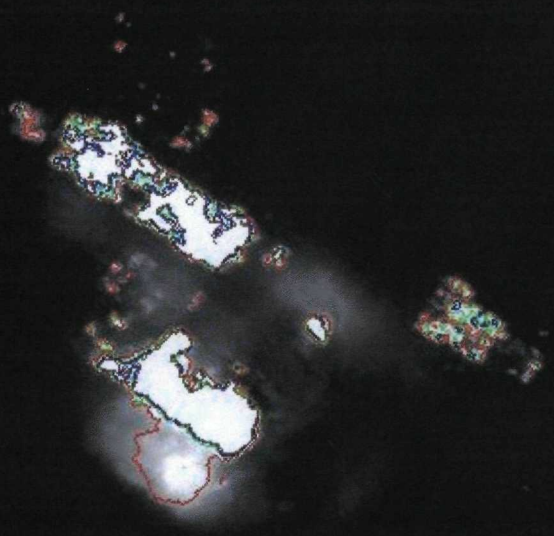


Figure 7 shows a base thermal classification of the fire. The RS-800 IR line scanner is a very accurate radiometric imager. Two calibration sources are used to set the dynamic range of the system. The contours shown are derived by using the lowest calibration temperature of 8.3 C and the highest being 30 C. All data falling between these temperatures are classified. Temperatures above 30 C are depicted as pure white.

Temp. Contour Levels



Red = 10 -15 degrees C

Green = 15 - 20 degrees C

Blue = 20 - 25 degrees C

Sienna = 25 - 30 degrees C

Pure White Areas Are Hotter than 30degrees C

Attachment G

SUMMA Canister Analytical Results

ANALYTICAL REPORT

Prepared by
Lockheed Martin Technology Services Group

Ohio Magnesium Fire Emergency Response
Cleveland, OH

January 2004

EPA Work Assignment No. 82-001
Lockheed Martin Work Order No. R1A82001
EPA Contract No. 68-C99-223

Submitted to
Raj Singhvi
EPA-ERTC

sn for Dennis Miller 1-21-04
Dennis Miller Date
Task Leader

Vinod Kansal 1/21/04
Vinod Kansal Date
Analytical Section Leader

sn for Dennis Miller 1-21-04
Dennis Miller Date
Program Manager

Analysis by:
REAC

Prepared by:
Mark Bernick

Reviewed by:
Joseph Soroka

Table of Contents

Appendices will be furnished on request.

Introduction

REAC personnel in response to WA 82-001, provided analytical support for environmentalsamples collected from the Ohio Magnesium Fire Emergency Response, located in Cleveland, Ohio as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, and the QA/QC results.

The samples were treated with procedures consistent with those specified in SOP #1008.

COC #	# of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory	Data Package
5-69741	2	12/30/03	1/6/04	Air	TO-14	REAC	N006

Case Narrative

The data in this report have been validated to two significant figures. Any other representation of the data is the responsibility of the user. No results less than 25 percent of the MDL were reported. Several target compounds were manually integrated during the calibrations; the data are not affected.

VOC in Air Package N006

In the initial calibration on 12/2/03 the percent relative standard deviation exceeded the QC limits for vinyl chloride (26%). This compound was not detected in the associated samples; the data are not affected.

In the continuing calibration on 1/6/04 the percent difference exceeded the QC limits for vinyl chloride (27%). This compound was not detected in the associated samples; the data are not affected.

Summary of Abbreviations

AA	Atomic Absorption
B	The analyte was found in the blank
BFB	Bromofluorobenzene
C	Centigrade
cont.	Continued
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
Dioxin	denotes Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans and/or PCDD and PCDF
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	Estimated maximum possible concentration
ICAP	Inductively Coupled Argon Plasma
ISTD	Internal Standard
J	The value is below the method detection limit and is estimated
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MDL	Method Detection Limit
MI	Matrix Interference
MS (BS)	Matrix Spike (Blank Spike)
MSD (BSD)	Matrix Spike Duplicate (Blank Spike Duplicate)
MW	Molecular Weight
NA	either Not Applicable or Not Available
NC	Not Calculated
NR	Not Requested
NS	Not Spiked
% D	Percent Difference
% REC	Percent Recovery
PAL	Performance Acceptance Limit
PPB	Parts per billion
PPBV	Parts per billion by volume
PPMV	Parts per million by volume
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SIM	Selected Ion Monitoring
TIC	Tentatively Identified Compound
TCLP	Toxicity Characteristic Leaching Procedure
U	Denotes not detected
W	Weathered analyte; the results should be regarded as estimated

m^3	cubic meter	kg	kilogram	µg	microgram
L	liter	g	gram	pg	picogram
mL	milliliter	mg	milligram	ng	nanogram
µL	microliter				

* denotes a value that exceeds the acceptable QC limit

Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 7/16/03

The samples were analyzed with procedures consistent with those described in REAC SOP# 1814 and detailed in the SUMMA canisters analytical reports (Appendix A). The VOC results are listed in Table 1.1; the tentatively identified compounds (TICs) are listed in Table 1.2.

Table 1.1 Results of the Analysis for VOC in Air
Ohio Magnesium Fire Emergency Response, WA # 82-001

Sample # :	Method Blank		REAC4348		REAC4347	
Location :	040106-1		Trip Blank		14200 Broadway Ave	
Date Sampled :	N/A		12/30/03		12/30/03	
Date Analyzed :	01/06/04		01/06/04		01/06/04	
Compound Name	Conc. ppbv	MDL ppbv	Conc. ppbv	MDL ppbv	Conc. ppbv	MDL ppbv
Chloromethane	U	4	U	4	U	4
Vinyl Chloride	U	4	U	4	U	4
Chloroethane	U	4	U	4	U	4
Trichlorofluoromethane	U	4	U	4	U	4
1,1-Dichloroethene	U	4	U	4	U	4
Methylene Chloride	U	4	U	4	U	4
trans-1,2-Dichloroethylene	U	4	U	4	U	4
1,1-Dichloroethane	U	4	U	4	U	4
cis-1,2-Dichloroethene	U	4	U	4	U	4
Trichloromethane	U	4	U	4	U	4
1,1,1-Trichloroethane	U	4	U	4	U	4
Carbon Tetrachloride	U	4	U	4	U	4
1,2-Dichloroethane	U	4	U	4	U	4
Benzene	U	4	U	4	U	4
Trichloroethylene	U	4	U	4	U	4
Bromodichloromethane	U	4	U	4	U	4
Dibromomethane	U	4	U	4	U	4
Toluene	U	4	U	4	U	4
1,1,2-Trichloroethane	U	4	U	4	U	4
Tetrachloroethylene	U	4	U	4	U	4
Ethylbenzene	U	4	U	4	U	4
m & p-Xylenes	U	4	U	4	U	4
o-Xylene	U	4	U	4	U	4
Styrene	U	4	U	4	U	4
1,1,2,2-Tetrachloroethane	U	4	U	4	U	4
1,3,5-Trimethylbenzene	U	4	U	4	U	4
1,2,4-Trimethylbenzene	U	4	U	4	U	4

Table 1.2 Results of the TIC Analysis for VOC in Air
Ohio Magnesium Fire Emergency Response, WA # 82-001

Sample #	Compound
Method Blank 040106-1	No TICs Found
REAC4348	No TICs Found

Table 1.2 (cont.) Results of the TIC Analysis for VOC in Air
Ohio Magnesium Fire Emergency Response, WA # 82-001

Sample: 15441 Conc. Factor: 2.0

Compound Name	Retention Time	Concentration (ppbv)*
unknown	2.983	4
acetaldehyde	4.161	9
acetone	7.341	14
butanal	11.094	4
unknown	11.285	4

*Estimated Concentration (Response Factor = 1.0)

Results of the Internal Standard Areas for VOC in Air

The internal standard areas (for bromochloromethane, 1,4-dichlorobenzene and chlorobenzene-d5) are listed in Table A6. All 18 values were within the acceptable QC limits.

Results of the Matrix Spike Matrix Spike Duplicate Analysis for VOC in Air

Sample REAC4347 was chosen for the matrix spike matrix spike duplicate (MS/MSD) analysis. The percent recoveries, listed in Table A5, ranged from 41 to 113. The relative percent differences (RPDs), also listed in Table A5, ranged from zero to two. No QC limits have been established for the above parameters..

Results of the Duplicate Sample Analysis for VOC in Air

Sample REAC 4347was chosen for the duplicate sample analysis (Table 2.1). RPDs are not reported because no target compounds were detected above their respective MDLs.

Table 2.1 Results of the Duplicate Analysis for VOC in Air
Ohio Magnesium Fire Emergency Response, WA # 82-001

Sample # :	REAC4347	REAC4347 Dup
Location :	14200 Broadway Ave	14200 Broadway Ave
Date Sampled :	12/30/03	12/30/03
Date Analyzed :	01/06/04	01/06/04

Compound Name	Conc. ppbv	MDL ppbv	Conc. ppbv	MDL ppbv	RPD	QC Limit RPD *
Chloromethane	U	4	U	4	NC	20
Vinyl Chloride	U	4	U	4	NC	20
Chloroethane	U	4	U	4	NC	20
Trichlorofluoromethane	U	4	U	4	NC	20
1,1-Dichloroethene	U	4	U	4	NC	20
Methylene Chloride	U	4	U	4	NC	20
trans-1,2-Dichloroethylene	U	4	U	4	NC	20
1,1-Dichloroethane	U	4	U	4	NC	20
cis-1,2-Dichloroethene	U	4	U	4	NC	20
Trichloromethane	U	4	U	4	NC	20
1,1,1-Trichloroethane	U	4	U	4	NC	20
Carbon Tetrachloride	U	4	U	4	NC	20
1,2-Dichloroethane	U	4	U	4	NC	20
Benzene	U	4	U	4	NC	20
Trichloroethylene	U	4	U	4	NC	20
Bromodichloromethane	U	4	U	4	NC	20
Dibromomethane	U	4	U	4	NC	20
Toluene	U	4	U	4	NC	20
1,1,2-Trichloroethane	U	4	U	4	NC	20
Tetrachloroethylene	U	4	U	4	NC	20
Ethylbenzene	U	4	U	4	NC	20
m & p-Xylenes	U	4	U	4	NC	20
o-Xylene	U	4	U	4	NC	20
Styrene	U	4	U	4	NC	20
1,1,2,2-Tetrachloroethane	U	4	U	4	NC	20
1,3,5-Trimethylbenzene	U	4	U	4	NC	20
1,2,4-Trimethylbenzene	U	4	U	4	NC	20

* Applies only to results above the MDLs.

ENVIRONM[illegible] PROTECTION AGENCY
Offi[illegible] f Enforcement

15
77 West Jac[illegible] Boulevard
Chicago, Illinois 60604

CHAIN OF CUS[illegible]ODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CON-TAINERS	Analyte: TO-14 REACT	Activity Code:
2001-DMR-122104	Garfield Alleys			

SAMPLERS. *(Print Name and Sign)* Stephen Wolfe Wolfe

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	TAG NUMBERS
3	12/30/03	01:35		X	14200 Broadway Ave	Summa 1
Blank						Trip Blank

Wolfe

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Date / Time
Wolfe	1-2-04 11:45		1/6/04
	1/6/04 1100		1/6/04 11:30 am
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time

Ship To:
Lockheed Martin / REAC

ATTN: Jerry Ingram

Airbill Number
837711835414

Chain of Custody Seal Numbers

Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Air samples were collected at the Garfield Alloys Emergency Response site in Cleveland, Ohio on 30 December 2003. A sample and a trip blank were collected in 6-liter passivated Summa canisters. The air samples were transported back to the Environmental Response Team Center (ERTC) facility in Edison, New Jersey. Before sampling, the Summa canisters were cleaned and certified using REAC Standard Operating Procedure (SOP) #1703, "Summa Canister Cleaning Procedures". The samples were analyzed according to REAC SOP #1814, "GC/MS Analysis of Sorbent Tubes and Summa Canisters", using gas chromatography/mass spectrometry (GC/MS).

2.0 GC/MS CANISTER PROCEDURES

2.1 Sample Pressurization

Before analysis, all canisters were pressurized. A pressurizing train with an in-line pressure gauge accurate to ± 0.1 pounds per square inch absolute (psia) was used. The gauge and train were purged with nitrogen gas (Ultra High Pure grade) for 5 minutes. The train was connected to the Summa canister and an initial pressure reading was recorded. The Summa canister samples were pressurized with nitrogen and a final pressure reading was recorded. A canister sample was pressurized 2 times the initial reading.

2.2 Summa Canister Analysis

Air samples were prepared for GC/MS analysis by cryogenically trapping an aliquot from the Summa canister. The canisters were attached to an Entech Model 7016 Summa Canister Autosampler connected to an Entech Model 7000 Concentrator. Sample analysis was initiated by cooling the first cryotrap, module M-1, to -160 degree Celsius (°C). Once M-1 was cooled, an aliquot of sample or standard was cryotrapped on it. This aliquot was transferred to a Tenax trap, M-2, to eliminate most of the water, and then cryofocussed on a third trap, M-3, before injection by direct heating into a Hewlett-Packard 5890 gas chromatography (GC) and 5971A mass selective detector (MSD) running ChemStation software. The cryogenic trap and GC/MS conditions are listed in Table A1.

2.3 Calibration and Sample Spiking

A standard mixture (Scott Specialty Gases, Inc. cylinder No. ALM017223) containing twenty-seven (27) target compounds at concentrations of 1.04 to 1.09 parts per million in volume (ppmv) (listed in Table 2) was diluted to a nominal concentration of 20 parts per billion (ppbv) in a Silco-steel passivated canister. An initial calibration was run by varying the volume of the nominal 20 ppbv standard from 50 to 1250 milliliters (mL), equivalent to 1 nanoliter (nL) to 25 nL. A daily standard was analyzed using the nominal 20 ppbv standard at 500 mL (equivalent to 10 nL).

Internal standards, bromochloromethane (BCM), 1,4-difluorobenzene, and chlorobenzene-d5 (Scott Specialty Gases cylinder No. ALM009519), were added to both samples and standards. These standards were diluted from a nominal concentration of 1 ppmv to 100 ppbv in a Silco-steel passivated canister. An aliquot of 100 mL (equivalent to 10 nL) was added to all standards and samples. Instrument performance check standard p-bromofluorobenzene (Scott Specialty Gases cylinder No. ALM057539) were diluted from a nominal concentration of 1 ppmv to 100 ppbv in a Silco-steel passivated canister. An aliquot of 70 mL of BFB (equivalent to 50 nanograms of BFB) was analyzed to validate the mass spectrometer tuning. Standard cylinder I.D. numbers, concentrations, and the quantitation ions are listed in Table A2.

2.4 Compound Identification/Quantitation

Target Compounds in the samples were identified and quantitated using ChemStation software. This software was used to tentatively identify and quantitate target compounds using reconstructed and extracted ion chromatogram which were matched with retention time windows. The report format includes the identified compound mass spectra (both raw and background subtracted), quantitation, and qualifier ion chromatogram.

Target compound results were initially reported in nL. The lower calibration standard nominal volume of 1 nL was used as the limit of qunatitation (LOQ) for all the target compounds. Target compounds detected at less than twenty-five percent of the LOQ were not reported. The target compound results were calculated in ppbv using the following equation:

$$Concentration(ppbv) = \frac{Quant\ Result\ (nL)\ x\ 1000}{Undiluted\ Sample\ Volume(mL)}$$

Non-target compounds were identified by a library search of all peaks in a chromatogram. The library search report prints out the sample spectrum along with the ten best library matches and the three best library match spectra. These matches were used along with mass spectral interpretation techniques to tentatively identify the unknowns. Estimated concentrations were calculated based on the total ion response of internal standards in each samples. Non-target compounds with total ion response greater than ten percent of the internal standards' total ion response in each samples were reported; however, non-target compounds appearing in the method blank and compounds, such as siloxanes and carbon dioxide, were not reported.

2.5 QA/QC

The following QA/QC procedures were performed for this analysis:

- The HP 5971A was tuned daily for perfluorotributylamine (PFTBA) to meet abundance criteria for p-bromofluorobenzene as listed in EPA Method 624. Tuning results are included in the QA/QC data section (Appendix B).
- An initial calibration by automated injection of varying volumes of a 20 ppbv standard were performed on 02 December 2003. All compounds met the relative standard deviations (RSD) of less than 25 %, except for vinyl chloride at 26%.
- A continuing calibration was performed on 06 January 2004. All compounds met the relative percent difference (RPD) of less than 25 %, except for vinyl chloride at 27.4%.
- Internal standards were added to all standards and samples. Percent recoveries were calculated against the daily standard, and are listed in Table A6. Recoveries were within 40% to 160% for the internal standards.
- A method blank were analyzed after the continuing calibration to check for carryover and to ensure that the system was clean.
- A duplicate was analyzed on sample 14200 Broadway Ave.
- A set of matrix spike and matrix spike duplicates (MS/MSD) was analyzed on sample 14200 Broadway Ave by spiking the samples with 500 mL of the 20 ppbv standard.

3.0 RESULTS

Summa canister target and non target results are listed in Tables A3 and Table A4. All results are reported in ppbv for Summa canister samples and blanks. MS/MSD recoveries are presented in Table A5. Internal standards recoveries are reported in Table A6. The chains-of-custody are in Appendix A. The Summa canister data is in Appendix B.

In Appendix B, the Analysis Log is followed by the calibration package for each day of analysis. The calibration package includes the daily analysis log, canister pressurization log, BFB tune, and initial or continuing calibration quant report. The quant report lists the retention time, quantitation ion, peak area, and concentration in nL. Concentrations listed on this quant reports are generated by using the average response factors of the initial calibration and the response factors of the continuing calibrations.

No target compound were found in sample 14200 Broadway Ave. The sample contained the non-target compounds acetaldehyde, acetone, and butanal, ranging from 4 to 14 ppbv.

A duplicate was analyzed on sample 14200 Broadway Ave. The results for all compounds were very consistent.

The recoveries of MS/MSD on sample 14200 Broadway Ave were ranged from 41 to 113 % and the relative percentage deviations (RPD) ranged from 0 % to 7 %.

4.0 DATA ASSESSMENT

The samples were treated with procedures consistent with those described in SOP # 1008, "Operation of Samples Refrigeration Unit and Sample Receiving, Handling and Storage".

The year on the raw data for the acquisition time and quantitation time are incorrectly printed as "104" and "19104". This is related to software problems for year 2004.

TABLE A1 - GC/MS Instrument Conditions

B. Preconcentrator Conditions:

M-1 Cryotrap Temperature	: -150°to -160°C
Internal Standard Trap Time	: 1.0 minute
Sample flow	: 150 mL/min
M-1 Cryotrap Desorb Temperature	: 10°to 20°C
M-2 Cryotrap Temperature	: -10°to -20°C
Transfer (M-1 to M-2) Time	: 4.5 minutes
M-2 Cryotrap Desorb Temperature	: 180°C
M-3 Cryotrap Temperature	: -160°C to -180°C
Transfer (M-2 to M-3) Time	: 3.5 minutes
Injection Time	: 2.5 minutes

B. GC/MS Conditions, Sample Analysis:

Initial Temperature	: 40.0°C
Initial Time	: 6.0 minutes
Ramp Rate	: 8.0°C/min
Final Temperature	: 220.0°C
Final Time	: 9.5 minutes
Run Time	: 35.03 minutes
Mass Scan Range:	: 35 to 250 AMU

Column: 0.25 mm x 30 meter Restek RTx-VOA, 3.0 µm film thickness (Restek Corporation)

TABLE A2 - Air Toxic Standards (Concentrations and Quantitation Ions)

Compound	Cylinder	Conc. (ppmv)	Quant. Ion
chloromethane	ALM017223	1.03	50
vinyl chloride	ALM017223	1.03	62
chloroethane	ALM017223	1.04	64
trichlorofluoromethane	ALM017223	1.08	101
1,1-dichloroethene	ALM017223	1.02	61
dichloromethane	ALM017223	1.02	49
trans-1,2-dichloroethene	ALM017223	1.02	61
1,1-dichloroethane	ALM017223	1.03	63
cis-1,2-dichloroethene	ALM017223	1.02	61
trichloromethane	ALM017223	1.02	83
1,1,1-trichloroethane	ALM017223	1.02	97
carbon tetrachloride	ALM017223	1.02	117
1,2-dichloroethane	ALM017223	1.02	62
benzene	ALM017223	1.03	78
trichloroethene	ALM017223	1.02	95
bromodichloromethane	ALM017223	1.03	83
dibromomethane	ALM017223	1.03	93
toluene	ALM017223	1.02	91
1,1,2-trichloroethane	ALM017223	1.02	97
tetrachloroethene	ALM017223	1.02	166
ethylbenzene	ALM017223	1.02	91
meta-xylene	ALM017223	1.03	91
ortho-xylene	ALM017223	1.04	91
styrene	ALM017223	1.02	104
1,1,2,2-tetrachloroethane	ALM017223	1.02	83
1,3,5-trimethylbenzene	ALM017223	1.03	120
1,2,4-trimentylbenzene	ALM017223	1.02	105
Internal Standards			
bromochloromethane	ALM040536	1.04	49
1,4-difluorobenzene	ALM040536	1.09	114
chlorobenzene-d5	ALM040536	1.04	117
Instrument Performance Check Standard			
p-bromofluorobenzene (BFB)	ALM057539	1.02	95

Table A3 - Air Toxic Target Compound Results for Summa Canister Samples
Garfield Alloys Emergency Response Site, Cleveland, OH WA # R1A82001
(concentrations in ppbv)

Sample Number	Method Blank	REAC4348	REAC4347	REAC4347 Rep
Sample Location	040106-1	Trip Blank	14200 Bway Ave	14200 Bway Ave
Date Sampled	N/A	12/30/03	12/30/03	12/30/03
Date Analyzed	01/06/04	01/06/04	01/06/04	01/06/04
Date File	ERS001	ERS002	ERS003	ERS004
Chloromethane	4 U	4 U	4 U	4 U
Vinyl Chloride	4 U	4 U	4 U	4 U
Chloroethane	4 U	4 U	4 U	4 U
Trichlorofluoromethane	4 U	4 U	4 U	4 U
1,1-Dichloroethene	4 U	4 U	4 U	4 U
Methylene Chloride	4 U	4 U	4 U	4 U
trans-1,2-Dichloroethylene	4 U	4 U	4 U	4 U
1,1-Dichloroethane	4 U	4 U	4 U	4 U
cis-1,2-Dichloroethene	4 U	4 U	4 U	4 U
Trichloromethane	4 U	4 U	4 U	4 U
1,1,1-Trichloroethane	4 U	4 U	4 U	4 U
Carbon Tetrachloride	4 U	4 U	4 U	4 U
1,2-Dichloroethane	4 U	4 U	4 U	4 U
Benzene	4 U	4 U	4 U	4 U
Trichloroethylene	4 U	4 U	4 U	4 U
Bromodichloromethane	4 U	4 U	4 U	4 U
Dibromomethane	4 U	4 U	4 U	4 U
Toluene	4 U	4 U	4 U	4 U
1,1,2-Trichloroethane	4 U	4 U	4 U	4 U
Tetrachloroethylene	4 U	4 U	4 U	4 U
Ethylbenzene	4 U	4 U	4 U	4 U
m & p-Xylenes	4 U	4 U	4 U	4 U
o-Xylene	4 U	4 U	4 U	4 U
Styrene	4 U	4 U	4 U	4 U
1,1,2,2-Tetrachloroethane	4 U	4 U	4 U	4 U
1,3,5-Trimethylbenzene	4 U	4 U	4 U	4 U
1,2,4-Trimethylbenzene	4 U	4 U	4 U	4 U
Pressurized Sample Volume (mL)	250	250	500	500
Initial Pressure (psia)	N/A	N/A	14.2	14.2
Final Pressure (psia)	N/A	N/A	28.4	28.4
Quantitation Limit (ppbv)	4	4	4	4

A - Assumed volume for Blanks
B - <3 times Method Blank value
C - Compound Calibration >25% RSD
D - Compound Calibration Check >25% RPD
E - Concentration exceeded calibration limit (25nL)
J - Below 1.00 nL Quantitation Limit
U - Not Detected
N/A - Not Applicable
ppbv - Parts per billion by volume

Table A4- Air Toxic Non-target Compounds
Summa Canister Sample Results

Garfield Alloys ER Site, Cleveland, OH, R1A82001

Sample Number:	**Method Blank**		**Page 1 of 4**
Sample Location:	**040106-1**		
Sample Volume (mL):	250		
Date Sampled:	N/A		
Date Analyzed:	01/06/04	Initial Pressure	N/A
Data File:	ERS0001	Final Pressure	N/A

Compound Name	Retention Time	Area	Concentration(ppbv)
No non-targets were found.			

Bromochloromethane (13.1)
1,4-Diflurobenzene (18.0)
Chlorobenzene-D5 (40.0)
* - Below 4 ppbv Limit of Quantitation
N/A - Not Applicable

Table A4- Air Toxic Non-target Compounds
Summa Canister Sample Results

Garfield Alloys ER Site, Cleveland, OH, R1A82001

Sample Number:	**REAC4348**		**Page 2 of 4**
Sample Location:	**Trip Blank**		
Sample Volume (mL):	250		
Date Sampled:	12/30/03		
Date Analyzed:	01/06/04	Initial Pressure	N/A
Data File:	ERS0002	Final Pressure	N/A

Compound Name	Retention Time	Area	Concentration(ppbv)
No non-targets were found.			

Bromochloromethane (13.1)
1,4-Diflurobenzene (18.0)
Chlorobenzene-D5 (40.0)
* - Below 4 ppbv Limit of Quantitation
N/A - Not Applicable

Table A4- Air Toxic Non-target Compounds
Summa Canister Sample Results

Garfield Alloys ER Site, Cleveland, OH, R1A82001

Sample Number:	**REAC4347**	**Page 3 of 4**	
Sample Location:	**14200 Bway Ave**		
Sample Volume (mL):	500		
Date Sampled:	12/30/03		
Date Analyzed:	01/06/04	Initial Pressure	14.2
Data File:	ERS0003	Final Pressure	28.4

Compound Name	Retention Time	Area	Concentration(ppbv)	
unknown	2.983	392666	4	*
acetaldehyde	4.161	1002981	9	
acetone	7.341	1594189	14	
butanal	11.094	434590	4	*
2-butanone	11.285	431892	4	*

Bromochloromethane (13.1)
1,4-Diflurobenzene (18.0)
Chlorobenzene-D5 (40.0)
* - Below 4 ppbv Limit of Quantitation
N/A - Not Applicable

Table A4- Air Toxic Non-target Compounds
Summa Canister Sample Results

Garfield Alloys ER Site, Cleveland, OH, R1A82001

Sample Number:	REAC4347 Rep		Page 4 of 4
Sample Location:	14200 Bway Ave		
Sample Volume (mL):	500		
Date Sampled:	12/30/03		
Date Analyzed:	01/06/04	Initial Pressure	14.2
Data File:	ERS0004	Final Pressure	28.4

Compound Name	Retention Time	Area	Concentration(ppbv)	
unknown	2.983	381252	3	*
acetaldehyde	4.153	1001022	9	
acetone	7.333	1562925	14	
butanal	11.086	444304	4	*
2-butanone	11.285	445461	4	

Bromochloromethane (13.1)
1,4-Diflurobenzene (18.0)
Chlorobenzene-D5 (40.0)
* - Below 4 ppbv Limit of Quantitation
N/A - Not Applicable

Table A5 - Air Toxic MS/MSD Recovery Summary for Summa Canister Samples
Garfield Alloys Emergency Response Site, Cleveland, OH WA # R1A82001
(concentrations in nL)

Sample Number		REAC4347	REAC4347 MS		REAC4347 MSD		
Sample Location		14200 Bway Ave	14200 Bway Ave		14200 Bway Ave		
Date Sampled		12/30/03	12/30/03		12/30/03		
Date Analyzed	Spike	01/06/04	01/06/04	%	01/06/04	%	
Data File	Amount	ERS003	ERS005	Recovery	ERS006	Recovery	RPD
Chloromethane	10.3	0.11	10.64	102	10.54	101	1
Vinyl Chloride	10.3	0.00	10.56	103	10.41	101	1
Chloroethane	10.4	0.00	4.28	41	4.25	41	1
Trichlorofluoromethane	10.8	0.00	7.30	68	7.39	68	1
1,1-Dichloroethene	10.2	0.00	6.53	64	6.49	64	1
Methylene Chloride	10.2	0.00	4.84	47	4.77	47	1
trans-1,2-Dichloroethene	10.2	0.00	6.00	59	6.45	63	7
1,1-Dichloroethane	10.3	0.00	9.23	90	9.25	90	0
cis-1,2-Dichloroethene	10.2	0.00	9.75	96	9.74	95	0.1
Trichloromethane	10.2	0.00	9.75	96	9.57	94	2
1,1,1-Trichloroethane	10.2	0.00	9.63	94	9.66	95	0.3
Carbon Tetrachloride	10.2	0.00	9.50	93	9.49	93	0
1,2-Dichloroethane	10.2	0.00	10.48	103	10.23	100	2
Benzene	10.3	0.00	9.49	92	9.45	92	0
Trichloroethylene	10.2	0.00	9.33	91	9.30	91	0
Bromodichloromethane	10.3	0.00	10.09	98	10.02	97	1
Dibromomethane	10.3	0.00	10.31	100	10.27	100	0
Toluene	10.2	0.00	10.06	99	10.00	98	1
1,1,2-Trichloroethane	10.2	0.00	10.50	103	10.50	103	0
Tetrachloroethylene	10.2	0.00	9.93	97	9.83	96	1
Ethylbenzene	10.2	0.00	9.70	95	9.53	93	2
meta & para-Xylenes	10.3	0.00	9.79	95	9.70	94	1
ortho-Xylene	10.4	0.00	9.79	94	9.73	94	1
Styrene	10.2	0.00	10.10	99	10.16	100	1
1,1,2,2-Tetrachloroethane	10.2	0.00	11.38	112	11.52	113	1
1,3,5-trimethlybenzene	10.3	0.00	9.62	93	9.59	93	0
1,2,4-trimethlybenzene	10.2	0.00	10.02	98	10.16	100	1

nL - Nanoliter

Table A6 - Air Toxic Internal Standards Recovery Summary

Summa Canister Samples

Garfield Alloys Emergency Response Site, Cleveland, OH WA# R1A82001

Internal Standards		Bromochloromethane	% Recovery	1,4-Difluorobenzene	% Recovery	Chlorobenzene-d5	% Recovery
Area of contiuning calibration		1167437	100%	3601577	100%	2785528	100%
Allowable Maximum area (160%)		1867899	160%	5762523	160%	4456845	160%
Allowable Minimum area (40%)		466975	40%	1440631	40%	1114211	40%
Area of samples							
ERS001	Method Blank 040106-1	1104316	95%	3530706	98%	2654081	95%
ERS002	REAC4348 Trip Blank	1113347	95%	3552388	99%	2664861	96%
ERS003	REAC4347 14200 Bway Ave	1073471	92%	3385812	94%	2626655	94%
ERS004	REAC4347 14200 Bway Ave Rep	1069576	92%	3350430	93%	2620976	94%
ERS005	REAC4347 14200 Bway Ave MS	1096374	94%	3237797	90%	2617428	94%
ERS006	REAC4347 14200 Bway Ave MSD	1105375	95%	3233503	90%	2613427	94%

Attachment H

REAC Air Sample Results

ANALYTICAL REPORT

Prepared by
LOCKHEED MARTIN, Inc.

Garfield Alloys Fire ER Site
Garfield Heights, OH

February 2004

EPA Work Assignment No. 82001
LOCKHEED MARTIN Work Order R1A 82001
EPA Contract No. 68-C99-223

Submitted to
D. Wright
EPA-ERTC

Miguel Trespalacios 2-2-04
M. Trespalacios Date
Task Leader

Analysis by:
REAC

Vinod Kansal 2/4/04
V. Kansal Date
Analytical Section Leader

Prepared by:
G. Karustis

2/5/04
D. Miller Date
Program Manager

Reviewed by:
J. Soroka

Table of Contents

Introduction

REAC in response to WA # 82001, provided analytical support for environmental samples collected from Garfield Alloys Fire ER Site, located in Garfield Heights, OH as described in the following table. The support also included QA/QC, data review, and preparation of an analytical report containing a summary of the analytical methods, the results, and the QA/QC results.

The samples were treated with procedures consistent with those specified in SOP #1008.

COC #	Number of Samples	Sampling Date	Date Received	Matrix	Analysis	Laboratory	Data Package
06126	14	12/30/03	12/31/03	Air	TAL Metals	REAC	N 019

Case Narrative

The data in this report have been validated to two significant figures. Any other representation of the data is the responsibility of the user.

TAL Metals in Air Package N 019

The original request on the chain of custody was for magnesium. At the request of the Task Leader, the samples were analyzed for TAL metals. The results of the magnesium analysis have been given in a previous report.

The field and trip blanks contained 0.15 µg/filter chromium and 0.059 µg/filter chromium, respectively after media blank subtraction. The chromium results for samples 14146, 14147, 14148, 14151 and 14152 should be regarded as not detected (U).

Summary of Abbreviations

AA	Atomic Absorption
B	The analyte was found in the blank
BFB	*Bromofluorobenzene*
C	Centigrade
cont.	Continued
D	(Surrogate Table) this value is from a diluted sample and was not calculated (Result Table) this result was obtained from a diluted sample
Dioxin and/or PCDD and PCDF	denotes Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans
CLP	Contract Laboratory Protocol
COC	Chain of Custody
CONC	Concentration
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DFTPP	*Decafluorotriphenylphosphine*
DL	Detection Limit
E	The value is greater than the highest linear standard and is estimated
EMPC	*Estimated maximum possible concentration*
ICAP	Inductively Coupled Argon Plasma
ISTD	Internal Standard
J	The value is below the method detection limit and is estimated
LCS	Laboratory Control Sample
LCSD	*Laboratory Control Sample Duplicate*
MDL	Method Detection Limit
MI	Matrix Interference
MS (BS)	Matrix Spike (Blank Spike)
MSD (BSD)	Matrix Spike Duplicate (Blank Spike Duplicate)
MW	Molecular Weight
NA	either Not Applicable or Not Available
NC	Not Calculated
NR	Not Requested
NS	Not Spiked
% D	Percent Difference
% REC	Percent Recovery
PPB	Parts per billion
PPBV	Parts per billion by volume
PPMV	Parts per million by volume
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SIM	Selected Ion Monitoring
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
U	Denotes not detected
W	Weathered analyte; Aroclor pattern displays a degradation of earlier eluting peaks

m^3	cubic meter	kg	kilogram	µg	microgram
L	liter	g	gram	pg	picogram
mL	milliliter	mg	milligram	ng	nanogram
µL	microliter				

*	denotes a value that exceeds the acceptable QC limit
	Abbreviations that are specific to a particular table are explained in footnotes on that table

Revision 7/16/03

Analytical Procedure for Metals in Air

Sample Preparation

Each cassette filter holder was carefully opened, and the filter sample was transferred to a clean 50 mL beaker and prepared according to ERTC/REAC SOP #1813, *Analysis of Metals in Air with a Modified NIOSH 7300 Method*. The samples were mixed with 5-mL concentrated nitric acid and heated using an adjustable heating device, capable of maintaining a temperature of 90 - 95° C, until the volume was reduced to approximately 0.5 mL. After digestion, the samples were allowed to cool to room temperature, transferred to 25 mL volumetric flasks, diluted to volume with dilution acid, and analyzed for all metals, except mercury, according to SOP #1811 *Determination of Metals by Inductively Coupled Plasma (ICP) Methods*.

One blank spike (BS) and one blank spike duplicate (BSD) sample (prepared using blank filters) were processed for each analytical batch of samples.

Analysis and Calculations

The ICP instrument was calibrated and operated according to SOP # 1811, and the manufacturer's operating instructions. After calibration, the initial calibration verification (ICV), initial calibration blank (ICB), and QC check standards were run to verify proper calibration. The continuing calibration verification (CCV) and continuing calibration blank (CCB) standards were run after every ten samples to assure proper operation during sample analysis.

The metal concentrations in solution were read directly from the read-out system of the ICP instrument. The concentration of metal ($\mu g/m^3$) in the air volume sampled was:

$$\mu g/m^3 = 1000 \times [(W-BLK) / V]$$

where:

W	= amount of metal on each filter (µg) = A x FV
A	= concentration of metal in the sample (µg/L) = B x CF x DF
B	= instrument read-out (µg/L for ICP)
CF	= conversion factor (1.00 for µg/L)
DF	= dilution factor for diluted sample (1.00 with no sample dilution)
FV	= final solution volume (L)
BLK	= amount of metal in the media blank (µg)
V	= Volume of Air sampled (L)

NOTE: BLK is the average of the media blank results (minimum 3). For blank values <MDL, substitute zero (0) for the raw data prior to calculating the average. The calculated average is then subtracted from each sample even if the average is < MDL.

For samples that required dilution to be within the instrument calibration range, DF is given by:

$$DF = (C+B)/C$$

where:

B = amount of acid blank used for dilution (mL)
C = sample aliquot (mL)

The results are listed in Table 1.1.
Revision date: 04/24/2003

Table 1.1 Results of the Analysis for Metals in Air
WA # 82-001 Garfield Alloy Site

Client ID		Media Blank #1		Media Blank#2		Media Blank#3		14153		14154		14155	
Location		Lab		Lab		Lab		Field Blank		Trip Blank		Lot Blank	
Air Volume (L)		-		-		-		0		0		0	
Parameter	Analysis Method	Conc µg/filter	MDL µg/filter	Conc µg/filter	MDL µg/filter	Conc µg/filter	MDL µg/filter	Conc µg/filter	MDL µg/filter	Conc µg/filter	MDL µg/filter	Conc µg/filter	MDL µg/filter
Aluminum	ICAP	U	0.63	U	0.63	U	0.63	U	0.63	U	0.63	U	0.63
Antimony	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Arsenic	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Barium	ICAP	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05
Beryllium	ICAP	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05
Cadmium	ICAP	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05
Calcium	ICAP	4.0	2.5	4.0	2.5	3.7	2.5	U	2.5	U	2.5	U	2.5
Chromium	ICAP	0.87	0.05	0.69	0.05	0.73	0.05	0.15	0.05	0.059	0.05	U	0.05
Cobalt	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Copper	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Iron	ICAP	0.28	0.25	0.32	0.25	0.25	0.25	U	0.25	U	0.25	U	0.25
Lead	ICAP	0.22	0.075	0.27	0.075	0.089	0.075	U	0.075	U	0.075	U	0.075
Magnesium	ICAP	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
Manganese	ICAP	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05
Nickel	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Potassium	ICAP	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0
Selenium	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Silver	ICAP	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05
Sodium	ICAP	U	25	U	25	U	25	U	25	U	25	U	25
Thallium	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Vanadium	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Zinc	ICAP	0.79	0.13	0.55	0.13	0.67	0.13	U	0.13	U	0.13	U	0.13

Table 1.1 (cont.) Results of the Analysis for Metals in Air
WA # 82-001 Garfield Alloy site

Client ID		14141		14142		14143		14144		14145		14146	
Location		Station#10 (DW)		Station#11 (DW)		Station#12 (Source)		Station#13 (UW)		Station#7		Station#8	
Air Volume (L)		960		916		960		956		960		960	
Parameter	Analysis Method	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³
Aluminum	ICAP	U	0.65	U	0.68	0.68	0.65	U	0.65	U	0.65	U	0.65
Antimony	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Arsenic	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Barium	ICAP	U	0.052	U	0.055	U	0.052	U	0.052	U	0.052	U	0.052
Beryllium	ICAP	U	0.052	U	0.055	U	0.052	U	0.052	U	0.052	U	0.052
Cadmium	ICAP	U	0.052	U	0.055	U	0.052	U	0.052	U	0.052	U	0.052
Calcium	ICAP	U	2.6	U	2.7	U	2.6	U	2.6	U	2.6	U	2.6
Chromium	ICAP	U	0.052	U	0.055	U	0.052	U	0.052	U	0.052	0.24	0.052
Cobalt	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Copper	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Iron	ICAP	0.76	0.26	2.6	0.27	1.4	0.26	0.95	0.26	0.36	0.26	0.29	0.26
Lead	ICAP	U	0.078	U	0.082	0.70	0.078	U	0.078	U	0.078	U	0.078
Magnesium	ICAP	U	5.2	U	5.5	U	5.2	U	5.2	U	5.2	U	5.2
Manganese	ICAP	U	0.052	U	0.055	U	0.052	U	0.052	U	0.052	0.057	0.052
Nickel	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Potassium	ICAP	U	5.2	U	5.5	U	5.2	U	5.2	U	5.2	U	5.2
Selenium	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Silver	ICAP	U	0.052	U	0.055	U	0.052	U	0.052	U	0.052	U	0.052
Sodium	ICAP	U	26	U	27	U	26	U	26	U	26	U	26
Thallium	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Vanadium	ICAP	U	0.13	U	0.14	U	0.13	U	0.13	U	0.13	U	0.13
Zinc	ICAP	U	0.13	U	0.14	0.25	0.13	U	0.13	U	0.13	U	0.13

Table 1.1 (cont.) Results of the Analysis for Metals in Air
WA # 82-001 Garfield Alloy site

Client ID		14147		14148		14149		14151		14152	
Location		Station#6		Station#5		Station#4		Station#2		Station#1	
Air Volume (L)		960		960		960		960		960	
Parameter	Analysis Method	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³	Conc µg/m³	MDL µg/m³
Aluminum	ICAP	U	0.65	0.75	0.65	U	0.65	U	0.65	U	0.65
Antimony	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Arsenic	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Barium	ICAP	U	0.052	U	0.052	U	0.052	U	0.052	U	0.052
Beryllium	ICAP	U	0.052	U	0.052	U	0.052	U	0.052	U	0.052
Cadmium	ICAP	U	0.052	U	0.052	U	0.052	U	0.052	U	0.052
Calcium	ICAP	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6
Chromium	ICAP	0.10	0.052	0.15	0.052	U	0.052	0.078	0.052	0.11	0.052
Cobalt	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Copper	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Iron	ICAP	U	0.26	0.74	0.26	0.70	0.26	0.47	0.26	0.38	0.26
Lead	ICAP	U	0.078	U	0.078	U	0.078	U	0.078	0.084	0.078
Magnesium	ICAP	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2
Manganese	ICAP	U	0.052	U	0.052	U	0.052	U	0.052	U	0.052
Nickel	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Potassium	ICAP	U	5.2	U	5.2	U	5.2	U	5.2	U	5.2
Selenium	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Silver	ICAP	U	0.052	U	0.052	U	0.052	U	0.052	U	0.052
Sodium	ICAP	U	26	U	26	U	26	U	26	U	26
Thallium	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Vanadium	ICAP	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13
Zinc	ICAP	U	0.13	0.17	0.13	U	0.13	0.24	0.13	U	0.13

Results of the BS/BSD Analysis for TAL Metals in Air

A blank was spiked and analyzed in duplicate as a blank spike/blank spike duplicate (BS/BSD). The percent recoveries, listed in Table 2.1, ranged from 81 to 110 and all forty-six values were within the acceptable QC limits. The relative percent differences, also listed in Table 2.1, ranged from 0 (zero) to 16 and all twenty-three values were within the acceptable QC limits.

Table 2.1 Results of the BS/BSD Analysis for Metals in Air
WA # 82-001 Garfield Alloy Site

Sample ID:	BS/BSD BS Spike Added	BS Conc	BS %	BSD Spike Added	BSD Conc	BSD %	RPD	Recommended QC Limits	
Metal	µg/filter	µg/filter	Rec	µg/filter	µg/filter	Rec		% Rec	RPD
Aluminum	10	9.8	98	10	10.3	103	5	75-125	20
Antimony	1.00	0.893	89	1.00	0.98	98	9	75-125	20
Arsenic	1.00	0.981	98	1.00	1.05	105	7	75-125	20
Barium	2.50	2.46	98	2.50	2.54	102	3	75-125	20
Beryllium	2.50	2.43	97	2.50	2.52	101	4	75-125	20
Cadmium	2.50	2.44	98	2.50	2.55	102	4	75-125	20
Calcium	50	47.7	95	50	49.8	100	4	75-125	20
Chromium	2.50	2.62	105	2.50	2.63	105	0	75-125	20
Cobalt	2.50	2.47	99	2.50	2.59	104	5	75-125	20
Copper	2.50	2.66	106	2.50	2.76	110	4	75-125	20
Iron 2599	10	10.1	101	10	10.6	106	5	75-125	20
Iron 2714	10	9.8	98	10	10.6	106	8	75-125	20
Lead	1.00	0.81	81	1.00	0.95	95	16	75-125	20
Magnesium	50	48	96	50	50.4	101	5	75-125	20
Manganese	2.50	2.51	100	2.50	2.6	104	4	75-125	20
Nickel	2.50	2.43	97	2.50	2.56	102	5	75-125	20
Potassium	50	46.6	93	50	50.2	100	7	75-125	20
Selenium	1.00	0.988	99	1.00	0.99	99	0	75-125	20
Silver	2.50	2.2	88	2.50	2.36	94	7	75-125	20
Sodium	200	188	94	200	199	100	6	75-125	20
Thallium	1.00	0.964	96	1.00	1.02	102	6	75-125	20
Vanadium	2.50	2.42	97	2.50	2.52	101	4	75-125	20
Zinc	2.50	2.42	97	2.50	2.63	105	8	75-125	20

AC, Edison, NJ
2) 321-4200
A Contract 68-C99-223

CHAIN OF CUSTODY RECORD

Project Name: Garfield Alloy
Project Number: R1A00001
LM Contact: M. Trespalacios Phone: (732) 494-4002

No: 06126
Sheet 01 of 01 (Do not copy)
(for addnl. samples use new form)

1/31/03

Sample Identification | * **Analyses Requested**

REAC#	Sample No	Sampling Location	Matrix	Date Collected	# of Bottles	Container/Preservative	Metals	Volume(L)		
328	14141	Station #10 (DW)	A	12-30-03	1	Cassette/None	✓	960		
329	14142	#11 (DW)					✓	916		
330	14143	#12 (Source)					✓	960		
331	14144	#13 (UW)					✓	956		
332	14145	#7					✓	960		
333	14146	#8					✓	960		
334	14147	#6					✓	960		
335	14148	#5					✓	960		
336	14149	#4					✓	960		
337	14150 ①	#3					✓	NA		
338	14151	#2					✓	960		
339	14152	#1					✓	960		
340	14153	Field Blank					✓	NA		
341	14154	Trip Blank					✓			
342	14155	Lot Blank			3		✓			
	XXXXXX	BS/BSD			2		✓			

MT

Matrix:
A- Air
AT-Animal Tissue
DL- Drum Liquids
DS- Drum Solids
GW- Groundwater
O- Oil
PR-Product
PT-Plant Tissue
PW- Potable Water
S- Soil
SD- Sediment
SL- Sludge
SW- Surface Water
TX-TCLP Extract
W- Water
X- Other

Special Instructions:
* Metal analysis by NIOSH 7300. Target metal Magnesium.
① Lost pump. No sample

LOT# 2557

SAMPLES TRANSFERRED FROM CHAIN OF CUSTODY #:

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished by	Date	Received by	Date	Time
All/Analysis	M. Trespalacios	12-31-03	Jim [illegible]	12/31/03	1:33	All/ 7300	Jim [illegible]	12/31/03	C. Dassen	12/31/03	1550

3200-DAR-020504